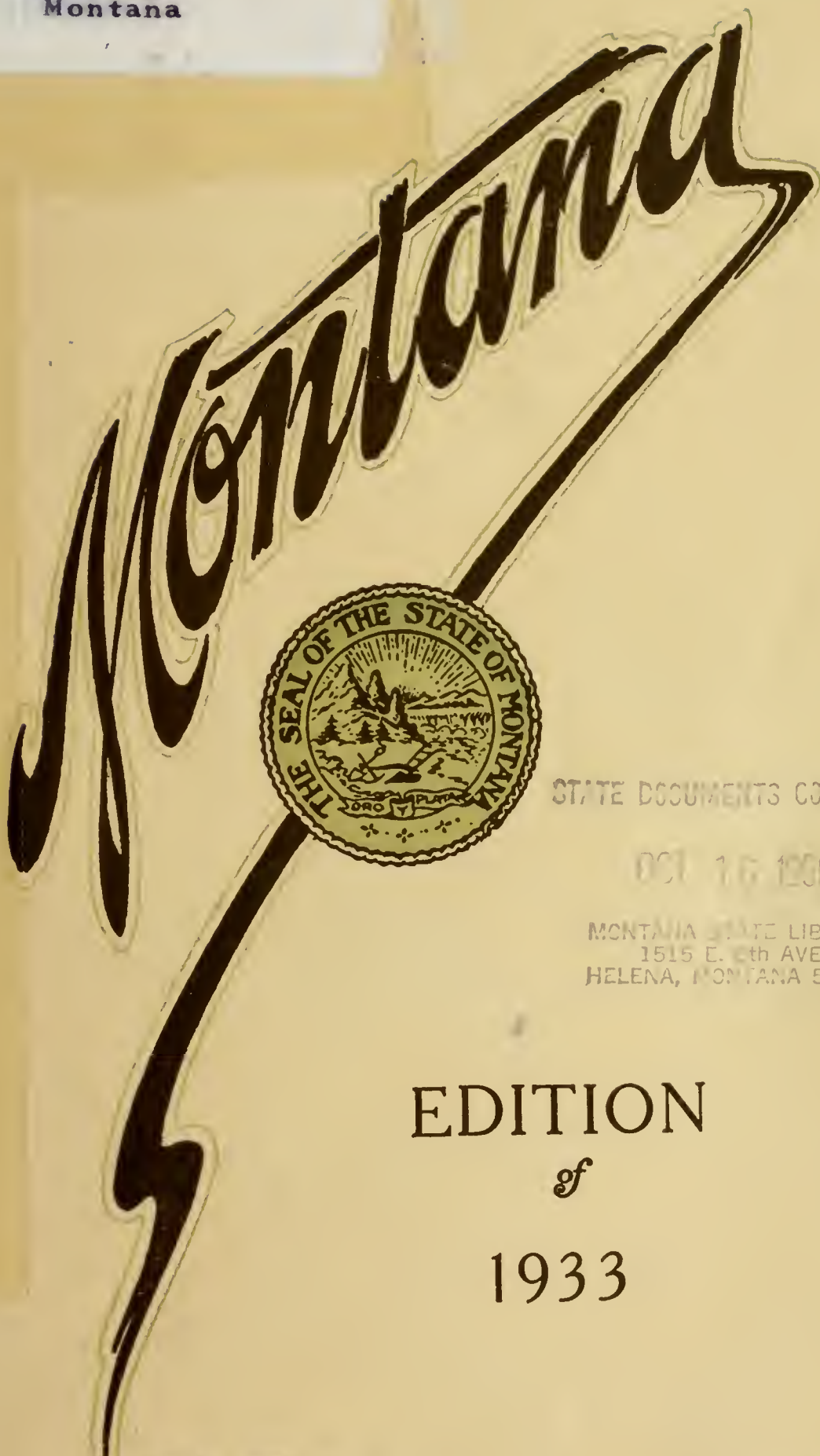


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MONTANA

RESOURCES AND OPPORTUNITIES

EDITION OF 1933

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AN EXECUTIVE INVITATION

United with the older and more populous states by bands of steel, modern highways and airways, Montana no longer presents the pioneering difficulties met by her earlier settlers but can now offer advantages as modern as those of the progressive states of the middle west and the Atlantic coast. Up-to-the-minute schools and colleges, industrial and commercial enterprises, public utilities and transportation facilities place its citizenry upon an as advantageous basis as those of the older commonwealths to the east, the south and the west.

Combined with these advantages is presented unlimited opportunities for expansion in all lines of industry, commerce, agriculture and other classes of activities to which the pioneer has opened the way but has not monopolized nor exhausted the fields of possibility.

With millions of acres of unutilized land, immense stretches of forest, vast underground reservoirs of precious or base metals, petroleum, natural gas and coal, and an unlimited supply of water, much of Montana's natural resources await development and give opportunity for profitable employment of millions in capital and the labors of thousands of men and women.

Montana has everything needed to make it one of the most populous and most prosperous states of the Union. It has inexhaustible resources, ideal climatic conditions, excellent transportation facilities and a spirit of optimism that has survived the depressing conditions of recent years. It has rolling plains, mountains, forests, great rivers and lakes and a vast expanse of alpine scenery which is rapidly becoming appreciated and is slowly forcing it into the lead as the vacation state of the Union. Modern, bituminous surfaced, mudless and dustless highways built in recent years from east to west and south to north across the state carry the motorist into the cities, the national parks and the scenic points of interest which present themselves in unnumbered array along the trunk and forest routes.

For the hunter and the fisherman Montana is a paradise. Elk, deer, bear and other wild game abound in her mountains and forests, while trout and other game fish populate her streams. Fishing and hunting, under reasonable regulations, is available to the non-resident sportsman and he is invited to the state to enjoy these privileges on an equality with its own citizens.

Montana is a state in which one can go back to nature, enjoy its awe-inspiring scenery, its warm days and cool nights; where one can either play or devote his time and efforts to personal advantage in its many fields of opportunity. Montana bids you welcome.



FRANK H. COONEY
Governor of Montana

FRANK H. COONEY.

HISTORY OF TREASURE STATE

Montana Carved from Louisiana Purchase—First Visitation by White Men—State's Development from Time of Early Fur Traders

THE MONTANA of today, the early history of which centered about the adventures of fur trappers and traders, has experienced a unique series of political wanderings beginning with the time when the greater portion of its area was claimed by an European power even before it had been viewed by the eye of a white man.

In the following two and half centuries that portion of the Northwest lying east of the Rocky mountains has been claimed by three of the great powers and during the 130 years it has been in the possession of the United States the territory included within Montana east of the Rockies has at different times been a part of six national subdivisions, while that west of the Rockies has been included in four.

Along with the rest of the Mississippi basin that part of Montana east of the Rockies was first a French possession, claimed for that nation on April 9, 1682, by La Salle, through right of discovery.

The United States Gains Possession

By treaty of November 2, 1762, France ceded this great area, the Territory of Louisiana, to Spain and it remained in the possession of that nation until October 1, 1880, when, by the secret treaty of San Ildefonso, it was retroceded to France, only to be sold by Napoleon to the United States for 80,000,000 francs under the treaty of Paris concluded April 30, 1803.

Under an act of congress of March 26, 1804, all that part of the Louisiana Purchase lying north of the 33rd parallel, including what is now Montana, was created the District of Louisiana, and placed under the jurisdiction of the governor of the Territory of Indiana, and a year later it became the Territory of Louisiana.

On May 30, 1854, it was included in the Territory of Nebraska; on March



PIERRE DE LA VERENDRYE
Mural by Paxson in Montana Capitol

2, 1861, it became a part of the Territory of Dakota; on March 3, 1863, its full area was included in the Territory of Idaho, and on May 26, 1864, in the identical form in which it now exists as a state it became the Territory of Montana.

That portion of the state lying west of the Rockies and not a part of the Louisiana Purchase, was originally the Oregon country, and was claimed by England until the settlement of the boundary dispute in 1846. Following this, in 1848, that portion of the Northwest became the Territory of Oregon; on May 2, 1853, most of that part of Montana west of the Rockies became a part of the Territory of Washington, and on March 3, 1863, all of it was placed in the Territory of Idaho to remain little more than a year until the creation of the Territory of Montana.

First Visitation by White Man

The first white men to set foot in Montana were four French hunters, traders and explorers headed by Pierre de la Verendrye, who had set out from a trading post on Lake of the Woods in Canada in April, 1742, on a trek undertaken with a view of eventually reaching the shore of the great sea to the west.

This party reached what is now southeastern Montana in the early part of January, 1743, and, viewing for the first time the great snow-covered mountains of that region, dubbed it "The Land of the Shining Mountains." The Verendrye party, having already encountered great obstacles on its journey, did not attempt to overcome the great rock barrier thrown across its way and soon returned to Canada.

Explored by Lewis and Clark

Nearly 60 years elapsed before white men again invaded this section of the northwest, and then only after President Jefferson, following the purchase of the Louisiana territory from France, commissioned Captains Meriwether Lewis and William Clark to explore the northwest and to report upon the characteristics of the then unknown country included in that acquisition, together with that lying to the west of the Rockies and on to the Pacific.

These intrepid and resourceful explorers, with a company of 32 all told, set out from St. Louis in 1804, made their way up the Missouri river in keel boats, entered Montana in the spring of 1805, made their way past the falls to the Three Forks of the Missouri, up the Jefferson and Beaverhead rivers, then overland through western Montana and finally down the Columbia river to the sea. Returning the following year, the party divided at Three Forks, one group retracing the route down the Missouri and the other following the Yellowstone to a meeting place at the confluence of those two streams.

Footing Gained by Fur Traders

During the next half century a slow development took place in the region which was confined largely to the activities of the fur traders. In the fall and winter of 1807-8, Manuel Lisa established at the junction of the Yellowstone and Big Horn rivers, the first fur trading post in Montana. Two years later, in April, 1810, Lisa promoted a second post, the first in importance in interior Montana, located at Three Forks, which did not long survive the enmity of the hostile Indians.

In 1829, Kenneth McKenzie established a post at the mouth of the Yellowstone river. In 1831, the same company erected a trading post below Fort Benton, known as Fort McKenzie. The present city of Fort Benton was established and built in 1846, by Alexander Culbertson, for the American Fur Company. With the fur traders came missionaries and explorers and Montana became the battleground of competing English, French and American fur companies.

Fort Union, on the Montana-Dakota border, three miles from the mouth of the Yellowstone, was probably the most pretentious establishment. It was a palisaded fort, built 30 feet high with stone and pierced for cannon. Here the Factor reigned supreme over an immense empire. To this place came the Indians from all the northwest tribes, while the Factor entertained from time to time many great scientists and men of letters, among them Maximilian, Prince of Wied.

Catlin, English artist, Audubon, naturalist, and DeSmet, pioneer Jesuit missionary, who came to study the aboriginal red man and the wild game that then swarmed over this region in countless thousands.

The Mullan Military Road

In 1853, congress appropriated money for the survey and construction of a wagon road from the head of navigation on the Missouri river to the Pacific coast. The work was supervised by Lieut. John Mullan of the U. S. Army, who, in August, 1863, completed the undertaking at a cost of \$230,000, having provided a road 624 miles in length, starting at Fort Benton, crossing the Rocky mountains through Mullan pass and on to a western terminus at Walla Walla, Wash. Built largely for the accommodation of immigrants to the Oregon country it aided in the development of western Montana.

The Discovery of Placer Gold

It was not until the discovery of gold at Gold Creek, Bannack and Virginia City, 1858-65, that large numbers were attracted to Montana. Then this territory began to play her destined part in what was probably the most momentous immigration movement in history, the settlement of the American west. The immigrants came partly as a back wash from California and the Pacific coast; overland by ox team from the middle west; and many came up the long stretch of the Missouri. Thus began the golden age of the Missouri.

While steamboats had been used around St. Louis since 1817, the first man to try the Missouri was Pierre Chouteau, fur trader. In 1832, he arrived at Fort Union. Nearly 30 years later, his son, Charles P. Chouteau, found that boats could go as far as Fort Benton.

Steamboat days began in earnest about 1859, and soon attained tremendous proportions. In 1859 more boats left St. Louis for upper Missouri points than for Mississippi river points. In 1867, 10,000 passengers were landed at Fort Benton and it was estimated that prior to 1880 approximately \$211,000,000 in gold and silver had been carried by boat down the Missouri from Montana.



MONTANA STATE CAPITOL AT HELENA

Photo by Swan

Vigilante Days and Indian Warfare

A colorful page was added to Montana's history when, following the discovery of its rich placer gold bearing sands and gravel which produced many millions in wealth, Vigilante organizations were formed in the principal mining camps to deal with the lawless element which drifted in from other parts of the west. For a time executions were the order of the day, until the territory had been rid of these parasites.

Indian troubles, which had constantly arisen along the wagon routes and in the more isolated sections, resulting in numerous killings and massacres, reached their climax and their final elimination in the middle '70s with the battle of the Little Big Horn in 1876, when the entire command of 264 men, under Gen. George A. Custer, was slain by an overwhelming force of Sioux directed by Chiefs Sitting Bull and Gaul, and in 1877 when, after the battle of the Big Hole in southwestern Montana, and the battle of the Bears Paw in northern Montana, Chief Joseph and his band of Nez Perce Indians from Idaho surrendered to Gen. Nelson A. Miles.

While furs and gold had been the magnets that had drawn settlers to Montana in the early territorial days, stock raising and agriculture gradually took on increasing importance and in 1880 the first rail line was built into the territory from the south. This was followed by the construction across the territory of the first northern transcontinental railroad, for which the golden spike commemorating the completion of that pioneer project was driven in western Montana, September 8, 1883.

In 1889 Montana was admitted to the Union as a state.

The early history of Montana and that of its transition from an Indian country into a highly developed civilization has been collected and is being preserved for posterity in the archives of the Historical Society of Montana, a department of the state government, housed in the Capitol at Helena.



WHERE CUSTER AND HIS BRAVE MEN FELL

GEOGRAPHY OF MONTANA

Third in Size Among States of Union—Western Part Mountainous—Rolling Prairies in Eastern Portion—Lowest of Western Mountain States

MONTANA is of imperial proportions—a mammoth state of 94,078,080 acres. It is the third state in size in the Union, only Texas and California being larger; England, Scotland, Wales and Ireland combined have fewer miles of territory. Montana embraces a greater area than all of the New England states, New York, New Jersey, Delaware and Maryland together.

Montana has an area of 147,370 square miles, including a water surface of 770 square miles. Ohio, Illinois and Indiana combined contain 136,060 square miles. It is the keystone state of the great American Northwest, lies between the 104th and 116th meridians of longitude west of Greenwich and between the 45th and 49th parallels of north latitude and is bounded on the north by the Canadian provinces of Saskatchewan, Alberta and British Columbia; on the east by North and South Dakota, on the south by Wyoming and Idaho, and on the west by Idaho.

The main range of the Rocky mountains crosses the western part of Montana, roughly dividing the state into two sections of unequal size, western and eastern Montana. The western part is a region of mountain ranges, interspersed with large or small valleys of frequent occurrence, and small streams. Foothills and mountains are usually heavily timbered. Eastern Montana consists generally of level, undulating table land broken occasionally by stream valleys and by branches of the Rockies or by isolated groups of mountains.

From the eastern boundary to the backbone of the continent the land gradually increases in elevation and forms a great plain of rolling country, large enough to contain several of the older states.

Lands fall about equally into three classes: farm lands, grazing lands and mountain lands. Each class comprises about 30,000,000 acres. Lands of the three classes sometimes lie close together; there is no sharp line of distinction between them and their boundaries are not well defined.

Lowest of Rocky Mountain States

A fact of prime importance in its bearing on climate and consequently on crop production, is that the elevation of both mountains and valleys in Montana is much less than that of the great mountain belt of Colorado, Wyoming, New Mexico, Utah and Nevada. The elevation of Santa Fe is 6,840 feet; of Denver, 5,400; of Salt Lake City, 4,350, and of Helena (near the base of the Continental divide) 4,110 feet.

The United States Geological Survey shows the average elevation of Montana above sea level to be 3,900 feet, compared with 5,600 feet for Nevada, 6,400 feet for Wyoming, and 7,000 feet for Colorado. "Taking the area of the state," says U. S. Census Bulletin 153, "it has been ascertained that 49 per cent is under 5,000 feet above sea level; 21 per cent from 5,000 to 6,000 feet; 14 per cent from 6,000 to 7,000 feet; 9 per cent from 7,000 to 8,000 feet, and 7 per cent over 8,000 feet."

Easy Grades to Mountain Passes

The low elevation at which the railroad lines cross the Continental divide, after hundreds of miles of moderate grades before entering the main range, and the altitude at the eastern and western boundaries, make evident the fortunate position that Montana occupies among the mountain states. Numerous low passes exist, and through these passes the warm winds from the Pacific ocean find their way and temper the climate. The Northern Pacific railroad



RELIEF MAP OF MONTANA

crosses the Continental divide at Mullan pass, at an elevation of 5,547 feet; Summit, the highest point on the Great Northern railway is 5,202 feet above sea level; and Donald, the station of highest elevation in the Rocky mountains on the line of the Chicago, Milwaukee, St. Paul & Pacific railroad, is only 6,332 feet.

Before reaching the summit, the Great Northern railroad runs 475 miles through the northern part of the state east of the main range, in that distance climbing from 1,922 to 5,202 feet; from the eastern boundary of Montana to the Mullan pass by the main line of the Northern Pacific railroad is 516 miles; and Chicago, Milwaukee, St. Paul & Pacific trains travel 504 miles in Montana before reaching the tunnel through which they pass from the Atlantic slope to the Pacific slope.

An Inexhaustible Supply of Water

Montana is generously watered. Two great rivers of the United States have their source in Montana. They are the Missouri, which drains over two-thirds of the state, and the Clark Fork of the Columbia, which drains a large portion of western Montana. The Missouri is formed at Three Forks by the union of the Jefferson, Madison and Gallatin. It flows north, then east, through the central-northern part of the state.

The western section of the state abounds in streams, which drain into the Kootenai and the Clark Fork of the Columbia. Among these are the Bitter Root, the Big Blackfoot, the Missoula and the Flathead.

Another large river is the Yellowstone, which has numerous affluents, the Powder, Tongue, Rosebud, Big Horn, Stillwater and Boulder, draining all the southeastern part of the state and carrying nearly as much water as the Missouri.

At the lowest water records in the history of the state, there was sufficient water in Montana to irrigate 10,000,000 acres, 4,000,000 more than the estimated amount of land that can at reasonable expense be irrigated. Stated in another way, the annual flow of water out of the state is sufficient to cover the entire state with water to a depth of six inches.

The waters of Montana do not all go off in great floods. In almost every mountain range are glaciers and fields of perpetual ice and snow. The snow that falls in winter melts in varying altitudes at different times and insures a steady flow of water at all seasons. From every mountain issue beautiful streams: pure, clear and cold they come dashing down, making their way seaward, in some cases with tremendous falls.

Topography of State

The melodious name Montana—selected for the territory when it was created in 1864—is appropriate to one-third of the state, the mountain area, containing about 30,000,000 acres. But even the mountain area is interspersed with productive valleys in which are located some of the most prosperous cities of the state. The mountain area is the treasure vault of the state, in which are found gold, silver, lead, copper, coal, iron, manganese, marble, building stone, asbestos, corundum, petroleum; even precious stones, the sapphire, the ruby, topaz and the garnet. In this region are found the great forests of Montana, one of the chief assets of the state.

In the mountains are many mineral and thermal springs whose waters are beneficial in the treatment of certain diseases. Some of these are near railroad stations, have ample accommodations for visitors and are largely frequented.

The mountains contain wood and water which are essential for mining operations and prospecting, great parks affording splendid pasturage for stock; they harbor the game the hunter and fisherman seek, and their grand and picturesque scenery appeals to lovers of the sublime and beautiful.

From one stately mountain in Glacier National Park rise three small streams. The waters of one of these find their way to the Pacific ocean, those of another to Hudson's Bay in the far north, while those of the third eventually reach the Gulf of Mexico.

Hundreds of Beautiful Lakes

Scattered among the mountains are many hundreds of these bodies of pure, cold water which become the source of many of the streams that wend their

ways down to the sea. Some of these lakes are of but few acres in area, while others take upon themselves the aspects of inland seas.

Throughout the expanse of Glacier park are scores of these beautiful lakes especially in that portion on the western slope of the Rocky mountains, while a short distance to the south lies Flathead lake, one of the largest bodies of fresh water in the west, about 30 miles in length, and 15 miles in extreme width and with an area of about 200 square miles. It is a most picturesque piece of water, hemmed in by mountains, containing numerous islands and a shore line dotted with orchard farms and summer resorts.

Hundreds of other lakes nestle in the mountains and are scattered about the plains to the east, most of them holding water in storage for domestic and industrial use or for irrigation.

Soil and Sunshine

A wide variance exists in the soils of this far-flung state. Generally the soil throughout the state is rich in the primary elements of fertility. It has not been impoverished by constant rains, or a succession of exhausting crops. At high altitudes the season is short; above certain elevations the crops will not mature; at the lowest elevations tender vegetables thrive. Soil surveys of a number of counties have been made by the Montana State College.

Another reason for the luxuriance of the crops grown in Montana in a comparatively short growing season, is that the percentage of sunshine is greater in this state than in the states to the east or west.

Miles City, in southeastern Montana, has an average of 1,767 hours of sunshine, between April 1, and September 30, as compared with 1,585 hours for Madison, Wis.; 1,639 hours for Terre Haute, Ind.; 1,574 hours for Detroit, Mich., and 1,677 hours for St. Louis, Mo. The claim has been made and at least partially sustained by weather records that there are five hours of sunshine in Montana to four hours in the Mississippi valley.



Photo by Jorud

GATE OF THE MOUNTAINS, MISSOURI RIVER, NEAR HELENA

PEOPLE AND INSTITUTIONS

High Type of Citizenship—Extremely Low in Illiteracy—White Races Strongly Dominant—Beneficial State Laws

THE population of Montana according to the 1930 census, as of April 1, was 537,606, a decrease of 11,283, or 2.1 per cent from the 1920 census, which showed a population of 548,889. The population in 1910 was 376,053, indicating an increase of 161,553 in the 20-year period, 1910-1930.

The increase in the period 1910-1920 totaling 208,856, was due to the heavy land settlement, while the decrease of 11,283 in the following 10-year period may be attributed to the depression in agriculture and livestock, also a curtailment in the production of metals, particularly copper and lead, following the World War.

The following table gives a graphic picture of the permanent growth of the state from the date of the first federal census:

Census Year	Population	Increase Over Preceding Year		Per Cent of Increase in the U. S.
		Number	Per Cent	
1870	20,595			26.6
1880	39,159	18,564	90.1	26.0
1890	142,924	103,765	265.0	25.5
1900	243,329	100,405	70.3	20.7
1910	376,053	132,724	54.5	21.0
1920	548,889	172,836	46.0	14.09
1930	537,606	-11,283	-2.1	16.1

According to the 1930 census, there are 318,611 persons over 21 years of age in the state, and 218,995 under 21 years. Of the total population in Montana 517,327 are white persons, 1,256 negroes, 2,571 Mexicans, 14,798 Indians, 486 Chinese, 753 Japanese, 295 Filipinos, 115 Koreans, four Hindus and one Hawaiian.

The total land area of the state is 147,370 square miles. That Montana is not overcrowded is indicated by the fact that it has an average of 3.7 inhabitants to the square mile, as compared with 41.3 persons to the square mile for the United States as a whole. Montana thus contains about one-twentieth of the land area of the United States, and about one-half of one per cent of the population. Were Montana as densely settled as her sister states, the population would be approximately 5,500,000. In common with many of the western states, the males predominate, the 1930 census indicating 293,228 males and 244,378 females.



SEELEY LAKE IN WESTERN MONTANA

A Land of Home Owners

Aside from the small shifting population necessarily found in every state, Montanans have faith in their state, as indicated by the number of homes owned. Of the total number of homes, three-fifths, or 77,308, are owned by their occupants and 53,362 rented. In percentage of home ownership Montana ranks with the first three states.

The percentage of illiteracy in Montana is placed at 1.7, according to the 1930 census, as compared with 2.3 in 1920. Illiteracy of native whites is only three-tenths of one per cent. The literacy census covers persons 10 years old or over.

Montana in the Political Picture

Generally regarded as a Republican state, Montana at times surprises her own citizens, as is shown by the returns for the various election periods which place the state in the "doubtful" class. Due to the operation of the direct primary law the state is protected against the abuses of unbridled political power and the free will of the people is at all times expressed. In the first national election following statehood, Montana's electoral vote was cast for Benjamin Harrison; in 1896 and 1900 for William Jennings Byran; in 1904 for Theodore Roosevelt; in 1908 for William H. Taft; in 1912 and 1916 for Woodrow Wilson; in 1920 for Warren G. Harding; in 1924 for Calvin Coolidge; in 1928 for Herbert C. Hoover, and in 1932 for Franklin D. Roosevelt.

With but two exceptions during statehood Montana has had Democratic governors, with a majority of Republicans holding the other elective offices, and in nearly all legislative sessions both houses have been overwhelmingly Republican. However, in 1933, the picture changed and for the first time in the history of the state, the governor, secretary of state, attorney general, auditor, treasurer, two out of three members of the railroad commission, and three out of five members of the supreme court were Democrats. Naturally, with such a set-up, the appointive heads of the various departments were also Democrats.

Past Presidential Vote of Montana

1892 (Pres.), Cleveland, Dem., 17,581; Harrison, Rep., 18,851; Weaver, People's, 7,334; Bidwell, Proh., 549.	1916 (Pres.), Wilson, Dem., 101,063; Hughes, Rep., 66,750; Roosevelt, Prog., 298; Benson, Soc., 9,564.
1896 (Pres.), Bryan, Dem., and People's (Populist), 42,537; McKinley, Rep., 10,494; Levering, Proh., 186.	1920 (Pres.), Cox, Dem., 57,372; Harding Rep., 109,430; Christensen, F.-Lab., 12,204.
1900 (Pres.), Bryan, Dem., 37,145; McKinley, Rep., 25,373; Woolley, Proh. 298; Debs, Soc., 708.	1924 (Pres.), Coolidge, Rep., 74,138; Davis, Dem., 33,805; LaFollette, Ind., 61,105.
1904 (Pres.) Parker, Dem., 21,773; Roosevelt, Rep., 34,932; Swallow, Proh., 335; Debs, Soc., 5,676.	1928 (Pres.), Hoover, Rep., 113,300; Smith, Dem., 78,578; Thomas, Soc., 1,667.
1908 (Pres.), Bryan, Dem., 29,326; Taft, Rep., 32,333; Chafin, Proh., 827; Debs, Soc., 5,855.	1932 (Pres.), Roosevelt, Dem., 127,286; Hoover, Rep., 78,078; Thomas, Soc., 7,891.
1912 (Pres.), Wilson, Dem., 27,941; Taft, Rep., 18,512; Roosevelt, Prog., 22,456; Debs, Soc., 10,885.	

Agricultural Legislation

Each session of the legislature lays particular stress upon laws for the benefit of the farmer and stockman. A majority of these laws are administered by the Department of Agriculture, Labor and Industry, though the various divisions of apiculture, dairying, grain grading and marketing, horticulture, scale testing, real estate, and labor and publicity. Laws pertaining to the livestock industry are administered by the Livestock Commission and the Livestock Sanitary Board.

County Agricultural Agents

The county agricultural agents under the supervision of the Extension Service render invaluable aid to the farmers, while the various state and county fairs provide a stimulus to the industry.

In building the agricultural industry on a foundation of stability, the value of the assistance rendered by county agents cannot be overestimated. Of the 47,495 farms in the state, 28,819 located in 27 counties are more or less under the supervision of county agents. Thus, 60 per cent of the state's farms have the advice and service of the county agents.

In the past 15 years since the introduction of extension work in Montana, the agriculture of the state has made steady progress and sound growth. Out of the vast amount of information obtained through scientific study and application of methods, have come certain basic principals so necessary to the successful production of crops in this state. Intensive study of irrigation problems, conferences of specialists and interested persons and reports of fact finding have done much to advance the cause of agriculture and stockgrowing in Montana, until they have now become the leading industry.

Smith-Hughes Agricultural Schools

Thirty-five high schools of Montana had Smith-Hughes agricultural departments in 1933. Of the 43 instructors who head these departments, 33 are graduates of Montana State College.

Smith-Hughes work is supported in part by federal funds and before departments can be established schools must comply with the regulations and requirements of the federal law under which the work is conducted. Many other Montana high schools have applied for agricultural departments but the number is limited to the amount of state money available.

The Smith-Hughes work in high schools of the state was first organized in 1918. In 1932 there were 32 such departments in the state and 991 farm boys successfully completed the year's work, including the practical farm projects required of all Smith-Hughes students during the summer vacation.

Boys' and Girls' 4-H Club Work

Another important activity is the 4-H club work for boys and girls, under the direction of a state club leader. This activity, approved by the United States Department of Agriculture and the Montana Extension Service, embraces the raising of livestock, particularly dairy cattle and baby bees, poultry and garden clubs. In the Home Economics section there are the clothing, foods, home storage, food preservation and room improvement clubs under a state supervisor. In 1932 7,108 boys and girls were enrolled in the 4-H clubs.

State Hail Insurance

In an effort to further aid the farmer, the Montana legislature in 1917 enacted a state hail insurance law, covering all grain crops and hay, to which were later added alfalfa seed, peas, beans, mustard and sugar beets. No taxes have been levied for carrying out the provisions of the law and from the first the department has been self-supporting.

The insurance varies according to the kind of crop, locality and other factors, ranging from \$2 to \$10 per acre, with an average of \$6.30, on which the average premium is 50 cents per acre.

For the period 1920 to 1932, the total amount of insurance carried was \$19,796,740 and the amount paid on losses for hail damage was \$1,256,392. The records show that the average amount of insurance carried per farmer is \$1,200 on which the average annual premium is \$96, or 8 per cent on the \$1,200. The average yearly payment per claim was \$308.

Old Age Pensions

Montana was the second state in the Union to enact an old age pension law and the first to put it into successful operation. This law has been in effect since March, 1923, and is administered by the boards of county commissioners of the various counties.



Eight Hour Law for Women

Montana laws for the protection of women workers, while not perfect, are better than similar laws in many other states. Under these laws no woman may be legally employed in any manufacturing, mechanical, or mercantile establishment, telephone exchange room or office, telegraph office, laundry, hotel or restaurant for more than eight hours in one day. Exceptions are made for emergency and Christmas work, and in the case of telephone operators in cities having a population of less than 3,000. The law also requires that women be provided with seats and other comforts totally lacking in many of the states.

Child Labor Law

Children under the age of 16 are prohibited from engaging in all hazardous, unhealthy and immoral occupations. According to the last federal census there are 66,889 children in the state between the ages of 10 and 15. Of these, 1,322 are gainfully employed, the per cent of children so employed being 2.0, ranking the state first among all states in percentage of children not employed.

Election Laws—Initiative and Referendum

Primary election laws insure every qualified voter the right to take part in naming all candidates from governor to constable.

Through the initiative and referendum the people may, reasonable provisions for ascertaining public sentiment having been complied with, override the actions of elected officials and enact measures of their own making.

Workmen's Compensation Act

The Workmen's Compensation Act was materially changed by the Legislative Assembly of 1929. This Act, passed in 1915, eliminated the old system of personal injury damage suits and brought every workman in a hazardous industry under the provisions of the Compensation Act. Prior to 1929 the maximum rate of compensation was \$15 per week, regardless of the number of dependents a workman had. In 1929 the legislature made a graduated scale of compensation benefits, with the maximum benefit rate of \$21 per week. Under this scale, a widow with four children can receive as much as \$21 per week for a period of 400 weeks, in the event her husband is killed in industry.

A workman who becomes a total disability as the result of an accident can receive as much as \$21 a week for a period of 500 weeks. The possible maximum compensation under the law of Montana is \$8,400 for a widow and \$10,500 for a workman who is totally and permanently disabled.

Organized Labor

Since 1895, when the Montana Trades and Labor council was organized, labor has been officially recognized. In January, 1908, a charter was granted by the American Federation of Labor to the Montana State Federation of Labor. The state federation has some 200 unions affiliated representing approximately 15,000 organized workers, exclusive of those employed by the railroads. The federation is always watchful of the interest of the workers at the state legislature and indorses or protests in the name of labor when measures affecting their interests are introduced. Several important laws affecting workers were passed by the 1933 legislature.

A Patriotic and Progressive State

The people of Montana are patriotic. During the World war, 35,000 entered the army or navy. In the Liberty Loan and other campaigns, Montana made an enviable record.

The people of Montana are progressive. For example, there are more than 43,500 radios in the state, 55,000 telephones and 89,000 passenger automobiles. Natural gas and electricity furnish heat and light for fully one-half the state's homes, while electrical appliances of all kinds are common.

A State of Wide Open Spaces

It is doubtful if any state in the Union can boast of the varied resources that vest Montana with the rightful title of "Treasure State." The soil, water, the air, the forests, the people and their institutions furnish a variety that lends spice to life and enjoyment in Montana. There are 175.4 acres in Montana for each inhabitant. The District of Columbia has but one-tenth acre, Rhode Island but one acre, and Washington, to the west, but 28.2 acres to each inhabitant.

CLIMATIC CONDITIONS OF STATE

Montana Has Two Distinct Climates Separated by the Continental Divide—Extremes of Temperature Vary Greatly According to Altitude

By WILLIAM E. MAUGHAN, Meteorologist
U. S. Weather Bureau, Helena.

A USEFUL knowledge of the climate of Montana primarily requires that particular consideration be given to the relation of its geographical and topographical characteristics to its climate, as well as to a study of the principal atmospheric disturbances that periodically or irregularly act singly or in unison, in close relationship or in direct opposition, as its dominant and controlling climatic influences.

Under the direct sweep of the prevailing westerly winds of the north temperate zone, Montana lies well within the interior of a vast continental area, remote from the nearest large body of water—the Pacific ocean. Approximately five-sixths of its area lies to the eastward and leeward of the great continental barrier of the Rocky mountains. The influence of this formidable barrier, which crosses the state from north to south in its western portion, combined with the interference of other but lesser mountain ranges between Montana and the Pacific coast, wholly or materially detracts from whatever pronounced effects the moisture-laden westerly winds from the Pacific might have in tempering the cold of winters and the warmth of summers.

State Separated Into Two Divisions

This huge barrier structurally and climatically separates the state into two rather distinct divisions. To the area west of the divide, it not only offers protection against the sudden and severe cold waves of winter, which sweep southward into Montana from the interior of Canada, but also effectively obstructs the further eastward passage of much of the moisture carried by the westerly winds, a circumstance resulting in more generous precipitation than would otherwise occur. While thus favoring the western and smaller climatic division of the state with a type of climate often referred to as semi-Pacific, it brings about quite a reverse situation in the eastern division, where the climate is commonly characterized as of a sub-arid continental type. West of the divide, the climate is mainly distinguished from that occurring to the eastward by more moderate winters, cooler summers, and a greater abundance and frequency of precipitation. The extreme ruggedness of the state, as shown in its elevation ranging from around 1,800 feet above sea level at its lowest point to above 12,000 feet at its highest peaks, accounts to a large extent for much of the great diversity of climate, particularly in local conditions, but at the same time rapid weather changes, aside from seasonal influences, largely determine the state's general climatic features.

Today's weather is tomorrow's climate. But today's weather in Montana may be so markedly different from yesterday's, and again so completely change on the morrow, as to definitely impress the meteorological observer with the state's one outstanding weather characteristic—instability. Of course, day-to-day weather changes, as a rule, are not so frequent as this, but the conditions cited do frequently occur. Rapid changes in temperature are most noticeable, and most prevalent and pronounced east of the divide, accounted for by Montana's close proximity to the principal paths over which there is almost a continual procession of high and low barometric pressure areas moving in an easterly or southeasterly direction across the state, or areas adjacent.

To comprehensively discuss all of the various phases of Montana's climate in this article is not the writer's purpose. A discussion in much detail, accom-

panied by statistical matter compiled from the beginning of weather records over the state up to the present time, is available for every principal climatological section, and may be obtained by addressing a request for such data to the Section Director, U. S. Weather Bureau, Helena, Montana.

Range of Temperatures

Some of the salient facts, however, relating to the climate of Montana, and based upon records compiled by the Weather Bureau, are presented in the following paragraphs.

The average annual temperature for the state for the period 1895 to 1932 inclusive is 42.6° , which is slightly higher than annual averages for Minnesota, North Dakota or Wyoming. The warmest area of any considerable extent, based upon a study of average annual temperature, is in the south-central portion traversed by the upper Yellowstone valley. A more limited area, almost equally as warm, is in the Bitter Root valley. The coldest area of any extent, mainly due to its elevation, is in western Beaverhead county, adjoining Idaho. That section of Montana immediately south of the Canadian border in Phillips, Valley, Daniels and Sheridan counties, is really the coldest area of the more habitable parts of the state.

The stations having the highest annual temperatures are: Big Timber, Sweet Grass county, and Ballantine and Billings, Yellowstone county, each with an average of 46.3° ; the station having the lowest is Bowen, Beaverhead county, with an average of 32.3° . Absolute extremes of temperature range from 117° recorded at Glendive, Dawson county, on July 20, 1893, to 65° below zero recorded at Fort Keogh (near Miles City) on January 13, 1888. The record at Fort Keogh represents the lowest official temperature ever recorded anywhere in the United States up to the close of 1932.

Maximum temperatures exceeding 100° have occurred at most of the reporting stations; while minimum temperatures ranging well below zero occur almost every winter, with the greatest extremes east of the divide. The occurrence of severely cold weather, however, is not so common as is generally supposed, nor are cold spells nearly so prolonged as in some other portions of the United States. Low humidity and little movement of air usually prevailing during most severe cold periods render the severity of the cold far more endurable than is generally known. The daily range in temperature is fairly large, and quite marked during excessively warm periods in the summer. July is the warmest month of the year, and January the coldest.

Periods of Extreme Changes

Seasons are likely to open and close at unusual dates. While winters are moderately cold, many of them for the most part are open and mild. Cold waves occur almost every winter with varying severity, but are often abruptly terminated by the occurrence of the well-known "chinook" condition, followed by a more or less extended period of warm and pleasant weather. Blizzards, signalized by rapidly falling temperatures, severe, penetrating cold, strong winds, snowfall, and poor visibility, occur at times, usually in conjunction with the onset of a cold wave. Ordinary outdoor occupations are often carried on most of the winter without much interruption and with little inconvenience. Retarded spring seasons, resulting from late freezing weather and snowfall in May and in a few districts as late as June, seemingly lengthen some of the winters.

The discomfort of excessively warm days is usually relieved by cool nights. While the summer season is short, crop growth is stimulated by the longer daylight hours of high latitudes and the greater intensity of sunshine incident to high altitude. The cool nights are especially effective in preventing the development of grain rust. The chinook type of winds, which are so welcomed in winter, sometimes become the hot, parching winds of summer that bring about a rapid deterioration of grain crops and range grasses within a few days. Late in summer however, these hot, drying winds prove particularly beneficial in the curing of native grasses, thus affording in winter much valuable fodder for livestock without the labor of gathering it. The fall months are usually dry, with no severely cold weather until December.

Average Annual Precipitation

The average annual precipitation for Montana is 15.48 inches. Although precipitation is fairly well distributed throughout the year west of the divide, to the eastward it is heaviest during the late spring and early summer, a circumstance highly favorable to agricultural interests. The heaviest annual precipitation, ranging on the average from 30 to 34 inches, falls in the region adjoining Idaho in the northwest, particularly in the western portions of Mineral and Sanders counties. There are several regions in the state where precipitation is light, and it is difficult to expressly indicate which region is the driest. From available records, Dell, in southern Beaverhead county, with an average annual amount of 8.7 inches, and Lonepine, in eastern Sanders county, with an average of 10.3 inches, are shown to have the lightest annual precipitation. Up to 1932, the greatest amount of precipitation recorded in any one year was 79.95 inches at Snowshoe, Lincoln county, in 1909, and the least amount recorded in any one year was 4.24 inches at Fort Shaw, Teton county, in 1874. A recorded amount of 1.78 inches, at Custer Station, Yellowstone county, in the year 1889, is actually the least annual amount ever recorded in the state, but this record has not been regarded as wholly reliable.

East of the divide, the lower levels and plains districts generally have an annual precipitation ranging from 12 to 16 inches on the average. Wide variation, however, may occur within a few miles, because of peculiar local topography. The average wettest month is June, with the exception of May in the southwestern portion; the average driest month is February, with the exception of August west of the divide, and November in the northeastern portion.

The average annual frequency of days with 0.01 inch, or more, of precipitation, based on figures up to 1930, is 97 days west of the divide, decreasing eastward to 67 days in the southeastern portion and 63 days in the northeastern portion. Haugan, Mineral county, has a maximum average frequency of 140 days a year.

Heavy Snowfall in Mountain Districts

Snowfall also shows great diversity of distribution, falling heaviest over the western mountain districts, and lightest upon the eastern plains. The average annual snowfall amounts to approximately 54 inches. Snowfall at several mountain stations exceeds on the average 100 inches a year. Saltese, Mineral county, with 161.5 inches holds the record for the heaviest average annual snowfall in the state, while Fallon, Prairie county, with 13.3 inches, holds the record for the lightest. Records for both of these stations were maintained for only a comparatively short time, and it is likely that the averages in each case would have been materially changed if the records had been carried on longer. The sustained flow of rivers and streams and the supply of irrigation water in the state during the summer are largely dependent upon generous and slow-melting accumulations of snowfall at the higher elevations. The snow that falls on the lower levels, particularly over the eastern plains regions, usually being of lighter amount and water content, generally diminishes rapidly through melting, evaporation, and the action of strong winds, which sweep it into drifts and depressions, leaving pastures and ranges uncovered for the winter grazing of all forms of livestock. On the other hand, winter grains, left unprotected through the lack of snow cover, often suffer extensive damage from severe cold and much winter-killing results.



WINDY GAP GLACIER

Frequency of Thunderstorms

Summer conditions are usually productive of thunder-storms of varying frequency and intensity. Occasionally, a violent thunderstorm occurs, accompanied by heavy, flooding downpours of rain, and by damaging wind and hail. The frequency of hail is greatest during July and August. Tornadoes are rare, and seldom particularly destructive when they do occur.

For the year, the average number of clear days is 161, partly cloudy, 107, and cloudy 97. The prevailing wind is from the west.

The length of the crop growing season, or frost-free period, is highly variable. Elevation is the greatest factor. The longest seasons invariably are found in the lower, warmer, and less rugged districts. The southeastern section with 125 days has the longest season, but is closely followed by the northeastern section with 123 days. The higher southwestern portion of the state has a season shortened to 105 days. In some districts at high altitude, where the agricultural interest is restricted almost solely to the production of hay, freezing weather occurs every month of the year.

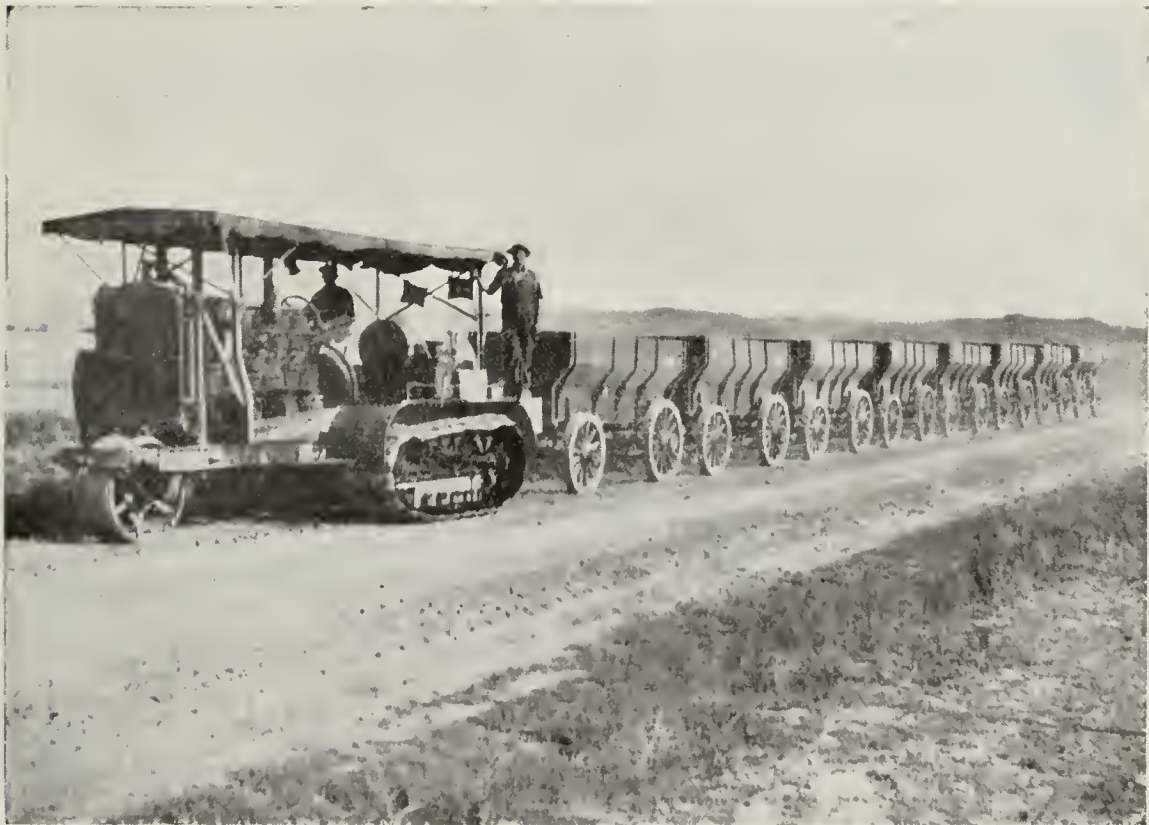
The larger table that follows gives the reader a concise idea of comparative annual climatic conditions for Montana for the period from 1895 to 1932, inclusive. The smaller table presents the average monthly and annual climatological data for the year 1932, only.

COMPARATIVE ANNUAL DATA FOR MONTANA

Year	Temperature				Precipitation					Number of Days			
	Mean	Departure	Highest	Lowest	Average	Departure	Greatest Annual	Least Annual	Average Snowfall	Precip. .01 in. or more	Clear	Partly Cloudy	Cloudy
1895	42.5	-0.1	107	-57	12.97	-2.51	22.57	6.73	50.9	71	.....	.....	.....
1896	42.6	0.0	111	-42	17.50	+2.02	26.28	8.51	62.8	71	.....	.....	.....
1897	42.3	-0.3	105	-46	15.71	+0.23	29.31	7.60	54.8	70	154	128	83
1898	42.2	-0.4	105	-37	16.82	+1.34	27.18	9.88	52.2	78	152	126	87
1899	40.4	-2.2	103	-61	15.28	-0.20	25.61	5.25	66.8	84	145	116	104
1900	45.1	+2.5	113	-43	13.34	-2.14	27.25	7.24	33.1	68	163	113	89
1901	43.6	+1.0	112	-34	15.08	-0.40	22.83	6.90	43.7	76	165	119	81
1902	42.0	-0.6	102	-38	15.26	-0.22	32.03	9.03	42.5	72	154	112	99
1903	42.3	-0.3	105	-45	15.03	-0.45	22.31	8.77	61.4	75	172	98	95
1904	43.5	+0.9	111	-42	11.04	-4.44	23.11	6.23	52.1	63	170	106	90
1905	42.6	0.0	104	-60	14.38	-1.10	25.26	6.76	46.1	71	169	101	95
1906	43.5	+0.9	109	-45	18.47	+2.99	34.20	9.60	43.1	76	176	93	96
1907	41.4	-1.2	105	-48	17.00	+1.52	49.13	8.30	50.9	80	165	101	99
1908	43.5	+0.9	109	-55	20.09	+4.61	61.81	9.47	57.5	79	174	95	97
1909	41.2	-1.4	108	-55	19.57	+4.09	79.95	8.12	68.2	84	163	101	101
1910	44.6	+2.0	112	-49	15.99	+0.51	58.62	6.07	55.1	69	178	104	83
1911	40.9	-1.7	106	-46	18.50	+3.02	38.55	7.82	74.6	90	160	108	97
1912	41.7	-0.9	102	-51	17.39	+1.91	38.11	8.55	57.9	85	152	108	106
1913	41.8	-0.8	102	-48	15.28	-0.20	30.06	7.68	57.5	81	166	109	90
1914	43.5	+0.9	107	-54	15.06	-0.42	32.02	8.07	48.3	77	155	120	90
1915	43.2	+0.6	102	-47	18.71	+3.23	31.86	10.87	41.6	89	143	120	102
1916	39.1	-3.5	104	-58	18.72	+3.24	38.94	9.49	79.0	88	163	112	91
1917	41.3	-1.3	110	-47	14.44	-1.04	36.74	6.35	73.6	77	173	98	94
1918	43.3	+0.7	110	-51	13.78	-1.70	31.65	6.18	49.0	77	160	105	100
1919	42.6	0.0	109	-52	11.14	-4.34	28.96	4.54	63.5	68	180	99	86
1920	42.6	0.0	106	-45	14.59	-0.89	28.04	7.11	42.6	84	165	95	106
1921	44.2	+1.6	110	-42	14.64	-0.84	33.36	7.29	55.7	79	168	98	99
1922	41.5	-1.1	104	-46	15.12	-0.36	33.72	9.54	62.7	78	171	95	99
1923	43.4	+0.8	107	-53	18.12	+2.64	39.74	9.66	46.4	85	163	102	100
1924	41.8	-0.8	110	-55	13.71	-1.77	29.74	5.52	55.6	82	157	97	112
1925	44.6	+2.0	110	-46	16.34	+0.86	38.05	9.07	49.8	85	150	104	111
1926	41.7	+2.1	110	-36	13.79	-1.69	35.01	7.27	45.8	75	156	108	101
1927	40.8	-1.8	104	-51	20.63	+5.15	43.03	8.74	73.0	105	133	110	122
1928	43.3	+0.7	107	-48	13.06	-2.42	37.89	6.39	45.5	74	167	104	95
1929	40.9	-1.7	110	-56	13.08	-2.40	24.70	6.39	65.4	78	162	100	103
1930	43.4	+0.8	110	-52	12.38	-3.10	29.28	6.17	35.0	73	162	111	92
1931	45.6	+3.0	110	-32	10.09	-5.39	33.63	4.33	32.0	61	166	110	89
1932	42.6	0.0	107	-42	16.17	+0.69	44.71	7.12	47.3	83	144	115	107
Period	42.6	.....	113	-61	15.48	.....	79.95	4.33	53.8	78	161	107	97

CONDENSED STATE SUMMARY FOR THE YEAR 1932.

Months	Temperature in Degrees Fahrenheit				Precipitation, In Inches			Average Number of Days				Prevailing direction of the wind
	Mean	Departure from the normal	Highest	Lowest	Average	Departure from the normal	Greatest local amount	Precip. (0.01 inch or more)	Clear	Partly cloudy	Cloudy	
January	18.1	-0.4	65	-35	0.64	-0.30	4.36	6	10	9	12	W
February	23.8	+2.7	79	-33	0.60	-0.13	7.51	5	10	10	9	SW
March	24.7	+5.5	72	-40	1.40	+0.49	6.32	10	7	10	14	NW
April	44.7	+2.3	84	-1	1.74	+0.59	4.50	8	9	10	11	W
May	53.9	+3.0	92	20	1.67	-0.56	4.90	8	11	12	8	W
June	61.7	+2.3	101	26	3.07	+0.46	9.15	10	14	9	7	W
July	67.9	+1.7	107	28	1.35	-0.19	3.02	6	19	9	3	W
August	66.2	+1.8	104	22	1.83	+0.68	5.77	7	17	10	4	W
September	55.7	+0.7	100	13	0.32	-1.06	1.50	2	20	6	4	W
October	42.1	-2.2	87	-10	1.50	+0.49	5.26	8	9	9	13	W
November	34.7	+2.5	71	-29	1.09	+0.19	7.35	7	7	11	12	SW
December	17.4	-5.1	64	-42	0.96	+0.07	6.67	6	11	10	10	W
Annual	42.6	+0.3	107	-42	16.17	+0.73	9.15	83	144	115	107	W



HAULING GRAIN TO RAILROAD FROM A GREAT MONTANA WHEAT FARM

A RECREATIONAL PARADISE

State is a Scenic Empire of Unparalleled Beauty—Mountains and Forests Present Unmatched Recreational Opportunities—Vast Primitive Areas Await Visitor

UNLIMITED recreational advantages are available in Montana to the tourist, the nature lover, the artist, the mountain climber, the fisherman, the hunter and the seeker for health.

The streams, many of them descending icy cold and emerald hued from the glaciers or snow banks of the high peaks, abound in leaping trout; the deep forests are the homes of countless thousands of deer, elk, and other types of wild life, while the mountains, dashing torrents and alpine lakes present a never-ending spectacle of inspiring beauty.

Dude Ranches and Hot Springs

Scattered about the state, especially in the mountain sections, are scores of hot springs resorts, all affording hotel, cabin or camping accommodations, while in even greater numbers in the shadow of the mountains or out on the wide open spaces, are "dude" or guest ranches offering entertainment ranging from that of the old-time cattle ranch to that of pretentious hotel life.

Camping sites, from the primitive to the regulated, modern camp type, are at the service of the traveler in the towns, the forests and the national parks.

During the tourist season Montana is blessed with bright, sunshiny days, and cool nights when sleep beneath blankets is general. Its high average altitude of 3,900 feet carries it above oppressing atmospheric humidity. Half of the state's area is in excess of 5,000 feet above sea level and its highest point nears 13,000 feet.

Improved motor roads, of which the trunk routes are almost wholly standard, oiled and surfaced highways, extend across the state, through the forests and over the mountains making travel through this entrancing scenic country a vacation trip from beginning to end.

Indian Reservations and Mountain Ranges

These roads carry the motorist to and through Indian reservations where some of the color and legendary history of the Old West have been preserved for the visitor by the remnants of once powerful tribes of red men. Montana's Indian population is approximately 15,000, most of whom are maintained upon the five remaining reservations and upon two reserves which have been partially opened to white settlement.

Approximately one-third of Montana's vast area is of a mountainous character. These rugged uplifts are mainly in the western and southern parts of the state. Extending from Glacier National Park on the



CANOEING ON HOLLAND LAKE

north to Yellowstone National Park on the south and forming the Continental divide, the main range of the Rockies winds its way across the state. Within the state are 42 distinct ranges or isolated groups of mountains, many hiding in their upper reaches living glaciers and emerald lakes, while thousands of cascading streams carry their waters to the large rivers below. Montana possesses 25 peaks of 12,000 feet or more, with Granite Peak, the highest of these, lifting its summit in the Absarokas to 12,850 feet.

Vast Stretches of Forest and Primitive Areas

Throughout the mountain sections of the state are 13 national forests with an aggregate area of 18,889,615 acres and containing approximately 32,000 miles of living streams. These vast, regulated reserves operate to maintain the natural scenic beauties of the region and especially their recreational advantages, while five immense tracts containing 1,181,000 acres have been set apart within these national forests as primitive areas within which no commercial enterprises may be admitted.

These primitive areas are carved out of the wildest of the mountain sections, remote from railroads and highways, containing no human habitations, and where the original wilderness and the wild life remains unmarred by the advance of commerce and industry. Into these areas the traveler is invited and here he may enjoy nature in its first setting.

In the Deep Timber of National Preserves

Within the far-flung stretches of the national forests, which are open to the tourist and the camper under such regulations as may be imposed by the U. S. Forest Service, are thousands of points of inspiring interest which cannot be described in detail in this publication and can be appreciated only through first-hand observation. A brief description of each of these forest reservations as prepared by the forest service follows:

Absaroka National Forest, in southern Montana, includes portions of Carbon, Gallatin, Meagher, Park, Sweet Grass and Wheatland counties. It has a gross area of 1,248,628 acres. The main division lies just north of Yellowstone National Park on both sides of the Yellowstone river. A smaller area, which includes the Crazy mountains, lies northeast of Livingston. In the main division are included two high mountain ranges: the Absaroka range, lying east of the Yellowstone river, and the Gallatin range, between the Yellowstone and West Gallatin rivers. The Crazy mountains include a number of high, sharp peaks with several glaciers and many beautiful lakes. The headquarters of the forest are at Livingston.

Beaverhead National Forest, which occupies a large part of extreme southwestern Montana, is located in Beaverhead, Deer Lodge, Madison and Silver Bow counties. It has a gross area of 1,997,461 acres. Along its western and southern boundaries lie the ranges of the Continental divide. The high peaks of the Wise river valley, known collectively as the Pioneer mountains, are included in the Wise river division of the forest. Some of these summits attain elevations of 11,000 feet or over. A smaller division of the forest, lying just west of the Red Rock river between Armstead and Lima, includes the Tendoy mountains. The headquarters are at Dillon.

Bitter Root National Forest, includes the mountainous country on both sides of the Bitter Root valley, taking in practically the whole watershed of the Bitter Root river. It has a gross area of 1,152,848 acres. A large part of Ravalli county is included in the forest; a very small part of Missoula county. The western boundary of the forest follows the crest of the Bitter Root range. For a long distance along the crest of the range, the Montana-Idaho line and the forest boundary are coincident. The east portion of the forest runs up to the crest of the Sapphire mountains, which form the divide between the Bitter Root river and Rock creek. The Sapphire range is heavily timbered, mostly with lodgepole pine, at the higher elevations. The summit of this range is crossed by the Skalkaho road which connects the Bitter Root valley with Philipsburg and Anaconda. The headquarters are at Hamilton.

Blackfeet National Forest, in the northwestern part of Montana, includes portions of Flathead, Lake and Lincoln counties. The gross area is 1,067,731 acres. The forest extends north to the international boundary. The eastern boundary of the northern part of the Blackfeet is coincident with the western boundary of Glacier National Park. The valleys of the Stillwater and Tobacco rivers practically bisect the Blackfeet. The forest is heavily timbered and contains a number of beautiful lakes.

In the northern portion is the Whitefish range. The mountains in the southwestern part are included in the rather indefinite grouping known as the Flathead mountains. A small detached section of the forest, lying just west of Flathead lake includes the rolling summits of the Blacktail range, the highest peak of which is Kerr mountain. The headquarters are at Kallspell.

Cabinet National Forest, is in western Montana, mostly in Mineral and Sanders counties, although small portions of Flathead, Lincoln and Missoula counties are included within its boundaries. The gross area is 1,345,201 acres. Generally speaking, the forest may be said to include the ranges lying on both sides of the Clark Fork valley from a point near the mouth of Thompson river to the Idaho line. The mountains to the northeast of the river are grouped in the Cabinet range; those to the south and west considered as belonging to the Coeur d'Alene mountain system. The headquarters are at Thompson Falls.

Custer National Forest. No forest in Montana is more diversified in character than the Custer, the divisions of which extend across southern Montana from a point just northeast of Yellowstone National Park to the South Dakota line. The forest has a gross area of 1,228,239 acres. Portions lie in Carbon, Carter, Park, Powder River, Rosebud, Stillwater and Sweet Grass counties.

The western, or Beartooth division, includes the Beartooth mountains, famous as one of the scenic areas of the United States. Granite Peak, the highest mountain in Montana, is located in this group. Here also is Grasshopper Glacier, particularly interesting because of the myriads of grasshoppers imbedded in the ice. Many other glaciers and high mountain lakes lend charm to the region.

Almost due south of Billings about 40 miles is the Pryor mountain division, which includes the Pryor range, a high plateau more or less dissected by canyons. South of Miles City, in Powder River and Rosebud counties, is the Custer division, which takes in 25 or more townships of low rolling hills forested with yellow pine. Still further east in Carter county are three similar but smaller divisions lying just south and east of Ekalaka. The headquarters are at Billings.

Deer Lodge National Forest, is comprised of a number of divisions in southwestern Montana in the vicinity of Butte, Anaconda and Philipsburg. It has a gross area of 1,336,344 acres. Parts of Deer Lodge, Granite, Jefferson, Madison, Powell and Silver Bow counties are included. The southwestern part of the Deer Lodge forest includes the Anaconda range, comprised of the high peaks along the Continental divide and the mountains at the head of Rock creek. Elevations run up to 10,000 feet and over. Another group of high mountains known as the Flint creek range is included in the portion of the forest west of the Deer Lodge valley. East of Butte the forest takes in a section of the Continental divide, and includes much of the forested slope on the east side to points in the vicinity of Boulder, Whitehall and Silver Star. The headquarters are in Butte.

Flathead National Forest is in northwestern Montana, between the Continental divide and Flathead lake south of Glacier National Park. It has a gross area of 1,900,476 acres. Parts of Flathead, Lake, Lewis and Clark, Missoula and Powell counties are included.

Three great stream valleys lie within the forest. In the western part is the Swan river; almost in the center and bisecting the forest from north to south is the extensive system of the South Fork of the Flathead river; and in the northeast corner, the Middle Fork of the Flathead.

The east boundary of the forest is formed by peaks of the Continental divide. On the west the forest extends down to the northern part of Flathead lake, which shore line it follows for 12 or 15 miles. Farther south the western boundary follows the high crest of the Mission range.

The Flathead forest contains some of the most remote country in the United States, and also some of the most scenic. The Mission mountain primitive area contains country of unsurpassed ruggedness and grandeur. The South Fork primitive area, although less rugged, is more extensive and embraces country unparalleled for wilderness recreation. The headquarters are at Kalispell.

Gallatin National Forest is located in southern Montana, near Bozeman. The gross area is 1,143,315 acres. It lies within Gallatin, Madison, Meagher and Park counties. The main division lies along the West Gallatin river and extends on either side to include the high Madison range on the west and the divide between the West Gallatin and the Yellowstone on the east. In the northern part of this division are the Spanish peaks, included in a primitive area. One well-known feature of this forest is the scenic road up the West Gallatin river from Gallatin Gateway to the west entrance of Yellowstone Park. The headquarters are at Bozeman.

Helena National Forest is located in west central Montana in the general vicinity of Helena. The gross area is 1,096,817 acres. The forest lies in Broadwater, Cascade, Gallatin, Jefferson, Lewis and Clark, Meagher and Powell counties.

One of the main divisions is a strip of mountainous country on the east side of the Missouri river extending from the Gates of the Mountains to Sixteen Mile canyon. It includes a large part of the Big Belt mountains. West of Helena is a portion of the forest which extends south along the Continental divide from the upper Blackfoot country. There is a small division east of Boulder. The headquarters are at Helena.

Kootenai National Forest is in extreme northwestern Montana. The gross area is 1,651,505 acres. The northern boundary is identical with the Canadian line, the western boundary with the Idaho state line. It is mainly in Lincoln county. The forest contains some of the finest yellow pine and larch timber in the state. On this forest just southwest of Libby are a group of peaks where may be found glaciers and a number of very beautiful sub-alpine lakes. The Kootenai river makes a great sweep through the forest from the Canadian boundary to the Idaho line below Troy. Its principal tributary in Montana, the Yaak, drains a large part of the northwestern section of the forest. The headquarters are at Libby.

Lewis and Clark National Forest comprises a group of widely scattered areas of forest land in west central Montana. It is chiefly within Cascade, Glacier, Lewis and Clark, Meagher and Teton counties, although small portions of Chouteau, Fergus, Golden Valley, Judith Basin, Phillips, Pondera and Wheatland fall within its boundaries. The gross area is 1,961,347 acres.

The western division lies on the east side of the Continental divide, and extends from Marias pass on the north to the divide of the Dearborn river on the south. Within this division is the Sun River game preserve, a 200,000-acre tract, set aside by the Montana legislature in 1912 as a refuge for the Sun River elk herd.

A large division of the forest lying south of Great Falls includes the Little Belt mountains. Smaller divisions include the Highwood mountains, just east of Great Falls; the Castle mountains, southeast of White Sulphur Springs; the Big and Little Snowy ranges, south of Lewistown, and the Little Rockies, an isolated group of mountains rising from the plains south of the Fort Belknap Indian reservation. The headquarters are at Great Falls.

Lolo National Forest is located in western Montana, mostly north and west of Missoula. It includes part of Granite, Lake, Lewis and Clark, Mineral, Missoula, Powell, Ravalli and Sanders counties. The gross area is 1,759,703 acres. The western section extends along both sides of the Clark Fork valley from a point a few miles below Missoula as far as St. Regis. The southern boundary of this section is the crest of the Bitter Root range which is also the state line. The portion of the forest lying northeast of Missoula includes the mountains of the Rattlesnake range, the chain of lakes in the Clearwater valley, and the rugged country about the head of Monture creek and other tributaries of the upper Blackfoot valley. One of the best known sections of the Lolo forest is that which includes lower Rock creek with its many beautiful camp sites, popular with the recreationist. The headquarters are at Missoula.

Location of the Primitive Areas

Primitive areas within the national forests, as created by the U. S. Forest Service prior to May, 1933, are tersely indicated as follows:

Absaroka Primitive Area is located in the southern part of the Absaroka forest, adjacent to the Yellowstone Park; area about 64,000 acres; a high mountain area, mainly wooded; has a heavy game population of bear, deer and elk; trout are plentiful in the streams.

Beartooth Primitive Area is in the Custer National Forest; a very high mountain area, noted for its scenic grandeur, its peaks, lakes and glaciers; includes Granite Peak the highest mountain in Montana, and the nationally-known Grasshopper Glacier; area approximately 375,000 acres. The principal appeal of this area is to the mountaineer.

Mission Mountain Primitive Area is within the Flathead National Forest on the east side of the Mission range at the headwaters of the Swan river. It is outstanding in grandeur and wildness, scenically spectacular, and contains glaciers and unique glacial evidence, alpine lakes, magnificent cliffs, and jagged peaks. Grizzly bear and mountain goats are found in abundance. Area about 67,000 acres.

South Fork of Flathead Primitive Area is a wild and rugged country within the Flathead National Forest about the upper watershed of the South Fork of the Flathead river; area about 625,000 acres; a country of well-stocked streams, mountain lakes, parks and meadows, with numerous delightful camp sites. Game of many kinds is abundant.

Spanish Peaks Primitive Area is a country of rough peaks, high lakes and mountain parks above timbered valleys; in the Gallatin National Forest, southwest of Bozeman; area about 50,000 acres.

Montana State Forests

In addition to the federal timber reservations the State of Montana maintains seven state forests, containing 203,000 acres of timber land, all located west of the main range of the Rocky mountains. These forests are administered by the state forester with headquarters at the State University in Missoula. Their descriptions follow:

Stillwater State Forest comprises a solid block of 90,000 acres northwest of Whitefish in Flathead and Lincoln counties. This area includes the headwaters of the Whitefish and a portion of the Stillwater rivers. About 65,000 acres of this block was obtained from the U. S. Forest Service under an exchange agreement involving unsurveyed sections 16 and 36 within national forest boundaries. The many beautiful lakes within this forest gives it unusual attraction for recreational purposes. The area is easily accessible from the Great Northern railroad and Roosevelt highway, which traverse its western boundary for a distance of 25 miles.

Coal Creek State Forest in Flathead county contains about 20,000 acres situated just west of Glacier National Park on the North Fork of the Flathead river. At the present time, this area can be reached only by trail, although the North Fork road lies close to the east boundary.

Swan River State Forest, comprising about 40,000 acres, was acquired from the U. S. Forest Service through an exchange of unsurveyed, timbered Sections 16 and 36. The area is located on both sides of the Swan river in Lake county, and it is unique in containing every type of forest indigenous to western Montana. The poor road through this area has prevented its extensive use for recreational purposes. It is now planned to construct an improved road through this forest, which will then make it easily accessible from Kalispell and Missoula.

Thompson River State Forest, named for the river running through it, contains about 16,000 acres of the choicest yellow pine stands to be found in the state. The good road extending through this forest from Plains to the Kalispell-Libby road, and the exceptional fishing and recreational advantages to be found along the streams are largely responsible for the rapid development of a summer home colony. For beauty, unmarred by fires and the woodsman's axe, this region is unsurpassed. This forest is the winter home of many hundred deer.

Lincoln State Forest near the headwaters of the Blackfoot river in Lewis and Clark county, contains 8,245 acres. The numerous trout streams of this region and its bracing summer climate have made it a popular place for vacationists from Helena and Great Falls.

Clearwater State Forest on the Blackfoot river and tributary streams in Missoula and Powell counties contains about 19,000 acres of valuable, merchantable timber, part of which is now under sale contract. This area is traversed by good roads and highways and on account of good fishing and attractive camp sites it is one of the most popular recreational centers in western Montana. The demand for summer home sites on the beautiful lake shores of this region has greatly exceeded the supply.

Sula State Forest comprises about 10,000 acres of almost pure yellow pine stands in a basin of the East Fork of the Bitter Root river in Ravalli county. It is ideally situated for logging operations, having easy slopes which extend upward from a small circular valley, giving it the local name of French Basin. This area is reached by fair roads, which extend from Salmon, Idaho and the Big Hole basin into the Bitter Root valley.



ANTELOPE GRAZING IN FOOTHILLS OF THE ROCKIES

STATE A VAST VACATION LAND

Hundreds of Dude Ranches Scattered Over the Plains and Among the Mountains Offer a Varied Wealth of Entertainment

MONTANA'S mountains and rolling prairies present unlimited opportunities for vacations which are typically American. They consist of carefree days spent on a western ranch, living the life of the open range, reveling in scenic beauty and tasting the glamour and romance of a region which produced and still lives picturesque traditions. It is as genuine as broad plains and high mountains, whispering pine forests, cataracts, invigorating air and warm sunshine; for it is composed of all of these.

In Montana, still the old frontier of less than a century ago, the appeal of ranch life is universal. There are distinctly different kinds of ranches, with such a variety of surroundings and activities that among them, all can choose according to their desires.

Dude ranches are real cattle and horse ranches, or guest ranches, hot springs resorts, mountain camps or summer hotels. Many of them are not only centers for exploration, hunting and fishing in their immediate vicinities, but are bases for camping, pack trip, fishing and hunting expeditions into wilderness areas.

Ranch hospitality appeals alike to individuals and groups. For family vacations the ranches are ideal. Their diversified life suits every member of the household.

The Yellowstone Vacation Area

The Yellowstone vacation area, within which are located scores of guest ranches and other vacation resorts, includes Yellowstone National Park, the scenic Beartooth, Absaroka and Crazy mountains, along with the forests, plateaus and valleys of the Yellowstone river drainage. In the Absaroka forest, a continuation of the scenic beauties of Yellowstone Park, the Rockies tower majestic and snowy. Rising from valley floors with an elevation of from 5,000 to 6,000 feet the Beartooth mountains abruptly attain heights of more than 12,000 feet. Deep in the mountains where only forest trails exist big game abounds. Here photographers find moose, elk, deer, bighorn sheep, antelope, bear, wolves, mountain lions and other wild animals even as great a lure as does the hunter.

Through this vast area of high peaks, rushing torrents, cliffs, glaciers and perpetual snowbanks, the federal government is now building a modern highway up and over the Beartooth mountains, across the high plateau to the south and on to Yellowstone Park for which it will serve within a few years as the most spectacular entrance to that wonderland.



A MONTANA DUDE RANCH

In the Big Horn Country

Often referred to as the old Indian and cattle country, the home of the Crow Indians, the Big Horn country stretches to the south of the Yellowstone country and takes in the northern portion of the Big Horn mountain range. Once the domain of countless buffalo and antelope, the lower slopes of the mountains are still the feeding grounds for shy herds of antelope.

Dude ranches are scattered about, many of them actively engaged in cattle and sheep raising and the entertaining of summer guests. Ranches of this type give the tourist a rare opportunity of taking part in the daily program of cattle raising, the branding, the roundup, the bronco "busting" and the rodeo. Ranches of the Big Horn forest are near the base of the mountains and extend out over the rolling plains where the holdings of the individual owners cover thousands of acres. Summer guests at these ranches have glorious times riding, hiking, fishing and adopting the ways of the west.

The Birthplace of Montana

Traditions of Lewis and Clark, of Indian troubles, of gold discoveries, of Montana Vigilantes and of the birth and development of the commonwealth still hover over the wild fastnesses of the Gallatin-Madison-Beaverhead country, a land of streams and wild game, mountains, forests and reminiscing pioneers, adjoining Yellowstone Park to the north-west. Three mountain ranges enhance its beauty, the Gallatin and the Madison mountains and the Bridger range of the Rockies. Here is an entrancing vacation land.

Many productive fishing lakes and streams are within easy reach by motor, saddle horse or on foot from the numerous ranches and camps. Elk, deer, bear, wolves and mountain lions are in the forests and hunters find the region most attractive during the fall hunting season. From the Gallatin-Madison-Beaverhead resorts the dude ranch trails lead back into the scenic heart of the Rockies.



DUDES IN THE ABSAROKAS

Central Portion of the State

Off the beaten trails in the central and central-western part of the state, mainly along the east slope of the main range of the Rockies and in the mountains to the east of the Missouri river, are hundreds of vacation regions and places of beauty.

Scattered through these hills, reminders of the golden past, are ghost towns or hamlets which once were prosperous mining camps productive of millions in gold and silver.

This district is hemmed in on the west by the Rockies, while stretching off many miles to the east are the long lines of uplifts comprising the Big and Little Belt ranges and the more isolated groups constituting the Highwoods, the Big Snowies, the Judiths, the Little Rockies and the Bears Paw mountains. Here and there throughout these highly scenic hills are hot springs resorts and dude ranches, all offering rich western entertainment tempered with accommodations bordering upon the modern.

A Premier Vacation Land

Within northwestern Montana—a truly vacation area—lies a vast expanse of wilderness made up of mountains, glaciers, forests, lakes, rivers and waterfalls, much of it accessible by rail or highway and still containing many deep primitive areas traversed only by trails cut out by wild game or by forest rangers.

This area is crossed by great rivers and mountain streams carrying water from the melting snows and glaciers down toward the sea. Hidden in the pockets of the mountains, especially along the west slope of the Rockies in the western half of Glacier National Park, are scores of large and beautiful lakes of sparkling, pure water, which drain through many miles of connecting streams into the magnificent Flathead lake, one of the largest bodies of fresh water in the United States.

Through this region flow the Flathead river with its three major forks, the Clark Fork of the Columbia, and the Kootenai, while dividing it into deep and fertile valleys are a number of imposing ranges including the Mission, Swan, Whitefish, Flathead, Purcell, Cabinet and Coeur d'Alene mountains.

Scattered about the broad valleys are many lakes, and, here and there in constantly increasing numbers, are guest ranches, lake and hot springs resorts all drawing from afar great numbers of summer vacationists.

Ideal Life on the Guest Ranches

Through these hundreds of guest ranches and hotel resorts a widely varying kind of accommodation and entertainment is afforded ranging from the more ordinary type of ranch life at reasonable rates to that of the elaborate and exclusive guest camp with its more expensive class of service and entertainment. In many of these resorts reservations are booked months ahead of the opening day and efforts are made to restrict patronage to certain numbers throughout the season. Others of a more public type, such as lake and hot springs resorts, accept over-night guests.

On many of the ranches herds of saddle horses are kept up for the guests, to each of whom is assigned a certain animal for his constant use. Wranglers and guides are employed to look after the horses and the comfort and protection of the guests, while tours or pack horse trips are regularly conducted far over mountain trails, for periods ranging from a day to several weeks. Good meals and soft beds contribute to the comfort and satisfaction of the guest and he is at liberty to loll about the cabins or lodges, or to fish, hike or ride the ranges or the trails as he may desire.



MONTANA ELK ON WINTER FEEDING GROUNDS

GAME ANIMALS AND FISH ABOUND

Deer, Elk and Other Species of Wild Life Roam the Forests by Thousands—Fish is Plentiful in the Streams and Lakes

MONTANA, with its millions of acres of forests and mountain retreats, is one of the nation's greatest reservoirs of wild life. Bear, elk, deer, moose, and mountain sheep and goats are found in great numbers among the mountains, antelope exist to a limited degree upon the plains, mountain grouse, prairie chickens and sage hens are still quite prevalent, wild ducks and geese breed in vast numbers upon the thousands of lakes, ponds, rivers and marshes of the state, while trout and other game fish populate the lakes and streams and furnish the major sport for the residents and for tourists from other states.

Tens of Thousands of Deer and Elk

According to the last wild animal census taken by the United States Forest Service (1932) the national forests of Montana contained 16,118 elk, 1,820 moose, 50,610 deer, 4,220 mountain goats, 1,883 mountain sheep, 5,834 black bear and 25 brown bear, 421 grizzly bear and three caribou. What numbers of game animals make other forests their habitat cannot be determined.

The same census showed the population of fur bearing animals in the national forests to be: beaver 15,995, fox 1,887, marten 9,385, mink 8,753, otter 234, miscellaneous 37,125; while the census of predatory animals showed 16,808 coyotes, 3,009 wild cats or lynx, 304 mountain lions and 12 wolves.

During the 1932 hunting season, October 15 to November 15, licensed hunters killed 10,023 deer and 1,883 elk within the state, the numbers of these and other game animals killed by man within the national forests being 6,306 deer, 2,621 elk, 10 moose, 36 mountain sheep and goats, 557 black bear, 29 grizzly bear and 65 antelope.

Thirty-five game and bird preserves have been established by the state fish and game commission which serve as inviolate retreat and as breeding grounds to replenish adjacent hunting and fishing areas. The commission also operates 14 separate fish hatcheries where millions of fingerlings are produced and planted in the thousands of lakes and streams of the state. Trained hunters and trappers are hired to keep down predatory animals.

Fish and Game Laws of State

Montana has stringent game and fish laws and all persons desiring to hunt or fish must first obtain licenses, excepting within Glacier or Yellowstone national parks. A resident license for fishing or hunting upland birds or water-fowl costs \$2, and one for hunting big game costs \$1. Non-resident licenses for fishing cost \$3.50, for hunting birds \$10 and for big game \$30. For aliens the license fee for fishing, only, is \$10, and the general license for fishing and hunting \$50. Hunting and fishing licenses may be procured from sporting goods dealers in most cities of the state. Licenses are not required of children under 15 years, nor of any person hunting, killing, or trapping predatory animals, prairie dogs, ground squirrels, skunks, weasels, jack rabbits, pocket gophers, hawks, crows or magpies. All licenses expire April 30, next succeeding their issuance.

It is illegal to hunt or kill any game animals or game birds from any automobile, nor shall game birds or game animals be killed or hunted from any airplane, power-boat, sail-boat or any floating device towed by a power-boat or sail-boat.

Twenty-five fish with a net weight of 20 pounds and one extra fish is the limit for a day's fishing and it is illegal to have more than 25 fish or more than 20 pounds net weight of fish in one's possession at one time. Game fish can be taken only by hook and line.

Open Hunting Seasons on Game

Open season for elk from October 15 to November 15. Limit, one elk. To remove the head or teeth of an elk and leave the edible portion in the field constitutes a felony. Closed season on elk exists in 45 counties of Montana and portions of Lewis and Clark, Powell, Missoula and Gallatin counties.

The open season for deer is from October 15 to November 15 and the bag limit is one male deer. Killing of deer is not permitted in Yellowstone, Daniels, Sheridan, Rosebud, Musselshell, Powder River, Carter, McCone, Carbon, Phillips, Garfield, Petroleum, Treasure, Liberty, Toole, Blaine, Teton and Valley counties and in certain portions of Glacier, Pondera and Gallatin counties.

Open season for grouse, prairie chicken, sage grouse, fool hen, pheasant, partridge, September 16 to September 25, both dates inclusive. Limit, five birds a day, or in one's possession at any one time.

Open season for ducks, geese and brant, September 16 to January 1. (Subject, however, to federal regulations under the migratory bird act.) Limit, 15 ducks a day or 30 in possession, and four geese or brant a day and eight in possession.

Open season for fur bearing animals—muskrat, fox, mink and fisher—December 1 to April 15, following.

Permanent closed season on mountain sheep and mountain goats, buffalo, moose, caribou, antelope, quail, Chinese pheasant, Hungarian pheasant or partridge, wood duck, curlew, swan, loon and turtle-dove.

STATE STILL HEAVY PRODUCER OF FURS

THE first commercial wealth produced in what is now Montana was taken out in the form of pelts by pioneer trappers and traders, the first white men to invade the northwest in the early part of the 19th century. The same form of wealth is being produced in pens and runways on 112 fur farms under license at the beginning of 1933.

Thousands of suitable locations for fur farming exist within the state and the number of farms can be expected to gradually increase as time passes. Standing first in area of forest reserves this state could lead the nation in fur production. Most of the farms under operation in the state are devoted to raising foxes, while others specialize in muskrats or chinchilla rabbits. Besides these, skunks, otter, raccoon, marten, fisher and mink are propagated.

Beaver, which was the main pelt taken in the early days, is still captured in large numbers under special permits issued by the state fish and game commission, the 1932 take amounting to 4,670 pelts. During 1932 shipments of fur pelts out of the state under permits were as follows: Muskrats 57,327, mink 5,137, beaver 4,660, fox 3,011, marten 1,695, fisher 2.



A SEASON'S TAKE OF PREDATORY ANIMAL PELTS

MANY HOT SPRINGS RESORTS

*Thermal Springs Possessing Medicinal Properties Bubble Forth
in Many Parts of State—Modern Accommodations
Provided for Guests*

ANOTHER natural phenomenon that attracts many visitors to Montana is the number and variety of thermal or mineral springs, the water of many having been found to be of particular value in the treatment of disease. While the different kinds of water are located in various sections of the state, it is not unusual to find several kinds in close proximity. The authenticity of the value of the various waters may be ascertained by writing to the State Board of Health, or direct to the resorts.

Many persons find relaxation from mental and physical strain in the soothing waters of the hot springs, while others make the plunges their source of entertainment.

In the early days before the settlement of the white man, the Indians discovered the value of the bubbling springs of hot and cold water and their appreciation was shown in their words of praise, "This is the dwelling place of the Great Spirit."

With the advent of the trapper and miner, the news of these marvelous waters was broadcast and gradually the commercializing of this natural resource became one of the state's industries. Today, accommodations of every kind may be found. Tourists may use the camp grounds adjacent to the springs, or may be cared for in modest cabin camps or in the more luxurious hotels. There is an accommodation to suit every fancy and every purse. A visit to these hot springs is an unusual experience. Brief descriptions of the various hot springs and resorts follow:

Alhambra Hot Springs—Seventeen miles south of Helena on U. S. 91, Park to Park highway, and Great Northern railway. Modern hotel, American plan. Plunge, baths, dance hall. On Banff-Grand Canyon road.

Barkell Hot Springs—South of Butte on Twin Bridges branch of Northern Pacific railway and main highway from Butte to western entrance of Yellowstone National Park. Plunge and camp grounds.

Big Hole Hot Springs—At Jackson, Beaverhead county, on western Park to Park road, Scenic International Highway. Small enclosed pool. Hotel accommodations in town.

Boulder Hot Springs—Two miles from Boulder, Jefferson county. Modern hotel, excellent service. Plunge and vapor baths. U. S. highway 91, and Great Northern railway to Boulder.

Bozeman Hot Springs—Seven and one-half miles from Bozeman, Gallatin county, on West Gallatin highway to Yellowstone National Park. Natural mineral springs; large plunge; tent city; dining room and dancing pavilion.

Broadwater Hot Springs—Two miles from Helena on U. S. 10N; Great Northern and Northern Pacific railways to Helena. Largest enclosed hot water plunge in the world. Tent city with electric lights and hot water. Hotel dining room, dancing. One mile from U. S. Veterans' Hospital No. 72.

Camas Hot Springs—On the old Flathead Indian Reservation, 20 miles north of Plains, on Northern Pacific railway and National Parks highway; can also be reached by stage from Kalispell, Missoula or Plains. Large plunge; medicinal mud baths; hotel accommodations, cottages, cabins and excellent camp grounds; dancing, fishing and hunting.

Chico Hot Springs—Twenty-five miles south of Livingston, Park county, on Yellowstone National Park highway and park branch of Northern Pacific. Plunge and private baths of natural hot mineral water. Saddle horses, fishing and mountain trips. Expert medical attention available. Open all year.

Elkhorn Hot Springs—In Beaverhead National Forest, 40 miles northwest of Dillon, reached from western Park to Park highway. Open plunge, tubs, showers, 15-room lodge, cabins, saddle horses, supply store, fishing. Forest Service camp grounds with free shelter, stoves and wood. Guides and pack outfits for big game hunting. P. O. address Polaris.

Hunter's Hot Springs—Twenty miles east of Livingston, Park county, six and a half miles east of U. S. highway 87 and two and one-half miles north off U. S. 10, and Northern Pacific railway. Plunge, vapor baths. Cottages, hunting and fishing. Free camp site and garage.

Gregson Hot Springs—Seventeen miles from Butte, south of U. S. highway 10S. Also reached by Great Northern, Northern Pacific and Milwaukee railroads from Butte and Anaconda. Plunge, vapor baths. Modern hotel, free camp grounds equipped with water and stoves.

Jardine Hot Springs—At Jackson, 40 miles west of Dillon, Beaverhead county on Scenic International highway and Oregon Short Line railroad. Hotel, plunge, good fishing, saddle horses, hunting in season. Camping trips into mountains.

Lolo Hot Springs—Reached by stage from Lolo, Ravalli county, on western Park to Park highway. Hotel, plunge. Cabins and tents, fishing. Lolo peak, elevation 11,000 feet, a landmark of the region.

McLeod Hot Springs—About 18 miles south of Big Timber, Sweet Grass county. Reached by U. S. highway 10 to Big Timber, or by Northern Pacific railroad. Hotel faces Boulder river. Tents and tent houses, separate dining room, dance hall, natural hot water plunge. Horses for rent. Good fishing, hunting in season.

Medicine Hot Springs—Eighteen miles south of Darby, Ravalli county, on U. S. highway 93, at the upper end of the Bitter Root valley. Hotel, plunge, bath houses, cabins. Good fishing. P. O. address, Conner.

Mill Creek Ranch—In the heart of the Rockies, modern in every respect. Riding, hiking, fishing and hunting. For information address C. L. Smith, Livingston.

Pipestone Hot Springs—Seven miles west of Whitehall, Jefferson county. Four miles north of U. S. highway 10, on Northern Pacific and Milwaukee roads. Modern hotel, large plunge, vapor baths, individual cabins, free camp sites. Saddle horses and pack outfits for excursions into mountains.

Potosi Hot Springs—Seven miles south of Pony, in Madison county, 15 miles west of Yellowstone Trail and National Parks highway. Eight miles of road through Potosi canyon, flanked by numerous majestic snow-capped peaks. The hot springs lie in a natural park at the foot of these peaks. No buildings, but camp grounds and hot springs free to public. Trout streams run through park.

Quinn's Hot Springs—On Missoula river about five miles from Paradise which is on state highway 3 and Northern Pacific railroad. Modern hotel and log cabins. Boating, fishing, hiking, saddle horses, hunting in season.

Sleeping Child Hot Springs—On Sleeping Child creek, 19 miles southeast of Hamilton, Ravalli county, which is on the western Park to Park route. Hotel, cabins, plunge, bath houses, fishing.

Sun River Medicine Springs—Seven miles from any road, in Lewis and Clark county. P. O. address Augusta. In the heart of the big scenic and game country. Outdoor swimming pool, warm water. Reached by Great Northern railroad to Augusta or Banff-Grand Canyon highway.

Three Forks Plunge—Located at Three Forks, Gallatin county, on U. S. highway 10, and Northern Pacific and Milwaukee roads.

2B Ranch—Ten miles above McLeod, Sweet Grass county, and south of Big Timber which is on Northern Pacific railway and U. S. 10. Large stone hotel, cabins and tents, plunge. Saddle horses, fishing and hunting in season. Pack trips.

White Sulphur Springs—At White Sulphur Springs, Meagher county, on Park to Park highway and on branch rail line from Ringling. Wonderful sulphur springs located in the town. Accommodations at hotels or private hospitals.

Ziegler Hot Springs—Twelve miles southwest of Twin Bridges on the Big Hole river. Northern Pacific railway or U. S. Highway 91 to Twin Bridges. Cabins partially furnished, electric lights. Good camp grounds. Plunge and hot baths highly mineralized. Fine fishing.



CLIFF LAKE IN SOUTHERN MONTANA

NETWORK OF IMPROVED HIGHWAYS

Modern System of Motor Roads Nearing Completion—Hundreds of Miles of Rock Surfaced Thoroughfares Cross State Leading to Scenic Regions

DEVELOPMENT within recent years of a modern highway system has facilitated travel between cities and has brought within easy reach of the motorist wonderfully beautiful and hitherto inaccessible scenic attractions in the forests and among the mountains which constitute approximately one-third of Montana's vast area.

Most of these highways carry the traveler upon gravel and, in some instances oiled surfaces, across the state and over the Continental divide, the backbone of America, at easy grades and at a maximum of wheeling comfort into deep forests and the shadow of towering peaks, along turbulent streams and past emerald lakes and magnificent waterfalls.

Good roads, rapidly approaching modernization, traverse the state from east to west and connect the two great national playgrounds—Yellowstone and Glacier parks. Two main avenues of travel cross the state from east to west, the high line, or the Roosevelt International Highway, upon which lies Glacier National park, the most inspiring of nature's handiwork, and the southern route, or the Yellowstone Trail, which leads to Yellowstone National park, nature's wonderland.

Between the high line and the southern route is a network of highways incorporating several organized "trails," which, while connecting the two parks, also serve some of the most important towns and cities and lead the tourist to many vacation centers and points of interest.

Rapid Progress in Highway Development

Montana has for several years been evolving a program of road construction and improvement under the state highway commission that is placing at the service of the motorist hundreds of miles of excellent highways. The state has been matching millions of dollars of federal aid funds for the purpose of providing gravel-surfaced roads.

The state's highway construction and maintenance work is under the direction of a commission of three non-salaried citizens of the state and is carried out by expert executives and engineers.

Montana has made great strides in the construction of standard highways during the past six years, and more especially in the years 1931 and 1932, when 221 construction contracts, including 82 for bridges, were awarded involving an initial expenditure of \$16,600,000. These figures do not include construction in national forests, the cost of which approximated \$1,750,000 for the two years.

From 1919, when Montana first availed itself of federal aid in the construction of real highways, up to the close of 1926, there were built 1,170 miles of new highways the cost of which, including bridges, was \$13,316,412.56, or an average of \$11,381.55 per mile.

During the period 1927-1930, the new mileage of highway construction totaled 1,290.7 at a cost of \$14,587,747.67, or an average of \$11,302.20 per mile, while in 1931 and 1932 new construction covered 1,086.9 miles at a cost of \$16,652,363.14, or an average of \$15,320.97 per mile.

During the period beginning with 1919, and up to 1933, there had been built from forest funds 354.2 miles of road at a cost of \$6,331,661.27, or an average of \$17,875.95 per mile, and from city and county funds 83.3 miles, costing \$1,249,500, or an average of \$15,000 per mile.

The total construction mileage of 3,985.1 represented the expenditure of \$52,137,684.64, or a per mile average of \$13,083.16.

A State of Great Road Distances

Due to the fact that Montana is a state of great distances and small population, development of improved highways was greatly retarded until recent years. The state has about 67,000 miles of public roads and, with a population of 537,606, this means a mile of road to each eight inhabitants.

Under federal aid system of trunk highways 7 per cent of this total mileage is eligible to assignment to the federal highway system. Under the law providing for the expenditure of state and federal funds for highway purposes the state is divided into 12 districts, to each of which is apportioned such percentage of the state funds available for federal aid construction as the ratio of the mileage of all uncompleted federal highways in the district bears to the mileage of all such uncompleted highways within the state. This insures an equitable distribution of highway improvement work. Under the plan toward which the highway department is continually striving the program for initial construction of the federal highway system should be completed in 1937.

Of the gross mileage of the federal highway system, 5,012.2 miles, 3,985.1 miles have had initial improvement, which consists of grading on a permanent alignment, and of this improved mileage 3,642.1 miles have been surfaced with crushed gravel, rock or scoria, leaving unsurfaced only 343 miles. Of the surfaced mileage 50.7 miles have been hard-surfaced and 1,197.1 have been oiled, leaving 2,349.2 miles of gravel surfacing. There remains 1,027.5 miles of the federal system upon which initial improvements remain to be performed.

Highway Building in Forest Areas

The forest highway system within or adjacent to national forests includes about 675 miles coincident with the federal highway system. Initial construction has been provided for 354.2 miles of this coincident mileage with federal forest highway funds including some county cooperation. In addition 134.5 miles of coincident forest highway have been built with federal aid, leaving 186.3 miles of unimproved coincident forest mileage.

During the 1932 construction season Montana improved 600 miles of highway by asphaltic treatment bringing the total of its oiled roads to 1,197 miles, of which 488 miles was of the penetration type, 521.2 of the road mix type, and 187.8 miles was of the plant mix type. The highway commission, at the opening of the 1933 season, hoped, if funds should become available, to oil approximately 1,000 additional miles of highway during the year, which would bring the total oiled mileage to about 2,200.

Maintenance of the federal highway system is exclusively the function of the state, no federal funds being available for this work. This maintenance work for the fiscal year of 1932 cost the state \$1,327,896.

The only state revenue which goes into state highway construction is the five cents per gallon gasoline tax, from which refunds of the tax are made upon all gasoline used for other purposes than the propelling of vehicles over the roads and streets.

The present approved federal highway system includes 35 numbered routes, of which 11 are included in the U. S. numbered highway system, an interstate system of trunk roads uniformly marked with the U. S. shield marker.



Designated Trunk Highway Routes

Montana is crossed by numerous motor routes, both interstate and intrastate, which in addition to touching all the important cities and points of interest carry the traveler through a country of varying scenic attractions from rolling prairies to towering mountains; through dense forests and beautiful valleys. These designated routes, together with their United States markings as they cover the route wholly or in part and in the order as the markings appear from east to west, or from south to north, are listed as follows:

Yellowstone Trail—Transcontinental route crossing Montana from east to west, serving many principal cities and Yellowstone National park. U. S. 12 and 10. Alternate route leaves U. S. 10 west of Missoula, via Ravalli, down the Clark Fork of the Columbia river through Thompson Falls to Spokane: U. S. 93.

Roosevelt International Highway—Northern transcontinental route crossing the state from east to west and touching Glacier National park. U. S. 2 and 93.

National Parks Highway—From east over Yellowstone Trail and serving both Yellowstone and Glacier National parks: U. S. 10, 10N, 93 and 2.

Custer Battlefield Hiway—From southeast, past Custer battlefield and on to Glacier National park: U. S. 87E and 87.

The Y-G Bee Line—Crossing Montana from Yellowstone National park to Glacier National park: U. S. 87W and 87.

Banff-Grand Canyon Highway—Route between Yellowstone National park and the Canadian National parks via West Yellowstone and Butte. U. S. 91 and 87.

Gallatin Way—From Bozeman, leaving U. S. 10, up West Gallatin river to western entrance to Yellowstone National park.

Geysers to Glaciers—A two-way route out of Yellowstone park, either out at West Yellowstone to Bozeman, or out at Gardiner to Livingston, and then north to Glacier park. U. S. 87W, 10N, 91 and 87.

Billings-Cody Way—Route from Yellowstone Trail to east entrance of Yellowstone park. From Billings U. S. 10, 310, 420 and 20.

Sunshine Trail—Route from Butte through Helena, Great Falls and northern Montana oil fields to Canada. U. S. 91.

Electric Highway—An east and west route through central Montana leaving Yellowstone Trail at Forsyth and ending at Helena.

Scenic International Highway—From Canada southward through western Montana, past Flathead lake, to west entrance of Yellowstone National park. U. S. 93 and 91.

Going-to-the-Sun Road—Highly scenic route across Glacier National park from east side at foot of St. Mary lake, past Going to the Sun mountain, over Logan pass, under the Garden Wall, and past Lake McDonald to west park entrance at Belton. Completed in 1933.

Red Lodge-Cooke City Park Approach Road—One of the most spectacular highways in the world. Up Rock Creek from Red Lodge and over the Absaroka mountains to the northeastern corner of Yellowstone National park. To be completed in 1935.

Vigilante Trail—From western entrance to Yellowstone National park, down the Madison river, past historic spots to Butte.

Skalkaho Highway—Westward from Butte, through the Skalkaho pass and down the Bitter Root valley to Missoula. U. S. 10S and 93.

Regina-Yellowstone Trail—From Canada south through eastern part of Montana and then west to Yellowstone National park. U. S. 10 and 87W.

Dominion-Yellowstone Trail—From Canada south through central part of Montana to Yellowstone National park. U. S. 87W.

GLACIER NATIONAL PARK

*Inspiring Region of Jagged Peaks, Glaciers, Lakes and Forests
Wholly Within Montana, Set Apart for Enjoyment
by the People*

By G. G. RUEHLÉ, Park Naturalist

GLACIER National Park is our only national park wholly Montanan, and well may the state be proud of it, for many regard it as the most magnificent of all. Its 1,534 square miles place it third in size, after Yellowstone and Alaska's Mt. McKinley, in the national parks' family. Lying just below the Canadian border in the northwestern part of the state, it is joined in Alberta by a Canadian sister, Waterton Lakes Park, the two being dedicated as a great International Peace Park in recognition of the biding peace between the two nations.

Glacier is described as the wildest, shaggiest block of mountain fastness in our country. Within it are two parallel ranges whose sides are scoured deep by ancient glaciers and whose knife-like crests bristle with saw-tooth peaks, flecked with bizarre snow patches and streaked with foaming waterfalls. Near the center of the park arises a low mountain, the only one of its kind on the continent, on whose summit meet the three major divides of the continent, which parts its waterfall between the three oceans surrounding North America. Nestling in deep, rock-rimmed cirques repose three score glaciers, remnants of mighty rivers of ice which flowed down the mountain sides, gouged out the valleys, and left, in some places, sheer reliefs of more than 6,000 feet. The park has over 300 lakes of many sizes and types, but each with its own, individual charm.

A Country of Sharp Contrasts

Glacier is replete with sharp contrasts. The deep, dense forests of the humid Pacific coast belt and the open stands of yellow pine on the west side, its tangle of Canadian spruce and lodgepole on the east side, the stunted groups of wind-harrowed trees at timber-line, the bleak bareness of the highest summits, the treeless Great Plains rolling eastward from the base of the Rockies, the small patches of sphagnum-bogs scattered here and there, all add to the zest of the park visitor.



LOGAN PASS IN GLACIER PARK

Besides a luxuriant forest in which every tree type of our northwest is represented except the Port Orford cedar, the park is a paradise of flowers. Of the 800 varieties of flowering plants, almost a quarter produce showy flowers which make the landscape gay from the disappearance of snow in early spring until snow flurries fill the air in November. Wave on wave of floral color sweep the vistas which blend with the hues of the highly-colored rocks of the mountains. Within this transcendent setting live 200 varieties of birds and thousands of wild animals, from moose to shrews. Every important species of mammals native to the United States except the raccoon and opossum has been native to the park. It was the meeting place of the caribou and mountain goat from the north and the buffalo and antelope from the plains; grizzlies and black bear, mountain sheep, elk, white-tailed and mule deer, mountain lions, wolves, coyotes, lynx, bob-cats, otter, beaver, and others swell the list of its interesting forest dwellers. There are no poisonous plants, fruits, nor reptiles in the park.

On the Edge of the Indian Country

Back of the beautiful setting is a romance of geology and history unsurpassed anywhere. Here a mountainous mass was uplifted and shoved over the plains for a score of miles, to be sculptured later by the slow-working ice of glaciers. The park is on the edge of the Blackfoot land, and Piegiens, Bloods, Siksikas, Flatheads, Kootenais, Nez Percés, Crees, Sarcees, Gros Ventres, Stonies, Assiniboines, Crono, Shoshones, Pend O'Reilles and other tribes have written in its history. The trader, trapper, prospector, hunter and explorer added thrilling chapters of adventure and daring persistence.

There are 17 United States rangers to protect park property and game, and a dozen naturalists from leading educational institutions to assist the park visitor in interpreting, knowing and appreciating this great wonderland. Commodious hotels, plainer but no less comfortable chalets, free government auto camps, and numerous hikers' camps provide for the guests' comfort and welfare. Camping, hiking, mountain climbing, exploring, fishing, and boating are among the favorite pastimes.

A Marvelous Scenic Highway

Although safe, well-maintained trails lead to practically every point of major interest in the park, an oiled surface highway bisects the park. This marvelous Going-to-the-Sun highway takes first rank among great scenic highways of the world. It runs through a cool cedar forest up Lake McDonald, parallels singing McDonald creek, clings precariously to the precipitous flank of the Garden Wall, winds among the snow banks and flowers of Hanging Gardens over Logan Pass (6,700 feet), slides down the side of Pollock, Piegan, and Going-to-the-Sun mountains, is cramped between red-topped Goat, glaucous-green Whitefish, and banded Singleshoot mountains on the one side, and the rock-rimmed St. Mary lake on the other, to burst out upon the open plains and meet the Blackfoot highway on the east side of the park.

To reach most of the glorious high mountain retreats and the summits of the noblest passes, one must abandon the unromantic machine for the saddle or foot trip. As the Glacier Park Transport Company provides comfortable auto conveyances over park roads, the Park Saddle Horse Company maintains a thousand gentle, sure-footed horses to use upon the excellent trail system. Chalets, camps and hotels are so located that numerous delightful trips may be taken without undue exertion or wear.

The main line of the Great Northern Railway skirts the park's south boundary, with principal stations at Belton and Glacier Park. The Theodore Roosevelt, Custer Battlefield, National Parks, Geysers-to-Glaciers and Banff-to-Gulf highways make the park accessible to the motorist.

Like all other national parks, Glacier comes under the jurisdiction of the National Park Service, a bureau of the Department of Interior. Its guiding hand is Superintendent Elvind T. Scoyen, who, with his staff of rangers and ranger naturalists, see to the welfare, comfort, and enjoyment of the thousands of annual park visitors. In 1930, 70,000 people visited the park, many staying throughout the whole season, which is from June 15 to September 15.

YELLOWSTONE NATIONAL PARK

*Nature's Wonderland is Primarily a Montana Institution—Its
Development Into First and Greatest of Playgrounds
Initiated by Montanans*

By GUY D. EDWARDS
Assistant Superintendent

YELLOWSTONE National Park, the first and most popular of the American playgrounds, is primarily a Montana institution although the bulk of its area is in Wyoming. Its wonders were first viewed and appreciated by residents of Montana through whose activities it was set apart for all time by the federal government, and, during the early period of its existence the great majority of its visitors entered through Montana.

Yellowstone park was officially discovered in 1870 by a party of Montana citizens headed by Gen. H. D. Washburn and was made a national park by an act of Congress signed by President Grant, March 1, 1872. It was the first national park. N. P. Langford, a Montanan, became its first superintendent. The park was administered by the Department of the Interior from 1872 to 1886. From 1886 to 1916 it was under the protection of the War Department, assisted by a civilian superintendent appointed by the Secretary of the Interior. In 1916 the National Park Service was formed as a bureau of the Department of the Interior, since which time that service has administered the affairs of Yellowstone and other national parks.

The park has an area of 3,438 square miles, largest in extent of the federal park series, an area of mountains, plateaus and lakes. The central portion is a broad, volcanic plateau with an average elevation of about 8,000 feet. Surrounding this on the south, east, north and northwest are mountain ranges with peaks rising from 2,000 to 4,000 feet above the general level of the inclosed table-land.

The entire region is volcanic, of which positive proof is apparent in the black glass of the Obsidian cliff, in the whorled and contorted lavas near the top of Mount Washburn, and in the decomposed and colored sands of the Grand Canyon.



A MONTANA PARK ENTRANCE

Geysers, Lakes and Highways

Within the park are over a hundred geysers, many of them beautiful and spectacular performers throwing immense jets of hot water and steam high into the air, some at regular intervals and others irregularly, all led by Old Faithful, a hard working and steady entertainer whose immense column is hurled upward at intervals of 70 minutes. From this spectacle the sizes and forms of the spouters descend to those of tiny fumaroles, to mud geysers, to cavities once the homes of live geysers, and to emerald colored pools in the basins of extinct or slowly expiring geysers.

Multi-colored terraces of immense size formed through countless centuries by deposits from the hot water springs, the blue-green expanse of Yellowstone lake hemmed in by mountains and forests, and the richly colored walls and slopes of the Grand Canyon of the Yellowstone into which the Great Falls of the Yellowstone with a sheer drop of 300 feet deposit the flow from Yellowstone lake; all these serve to inspire the spectator with awe and wonderment.

Lying in the west and south-central portions of the park are five geyser basins of which the Norris and the Upper and Lower Basins are the most important, but with hot water manifestations occurring with frequency in more widely separated areas.

The park has a delightful climate during the tourist season when the mean average temperature ranges from 54 to 64 degrees and with a maximum of 88 degrees.

Within the park are about 360 miles of roadway, of which 165 miles constitute the main loop highway and are completely surfaced. In recent years millions of dollars have been expended in bringing the highways to a high standard in which sharp curvatures have been eliminated, steep grades have been reduced and surfaces have been graveled and oiled.

Hotels, Lodges and Camps

Four magnificent hotels and five permanent camps are located throughout the park with special reference to scenic attractions. The buildings are unique and modern, and the camps with their scores of sleeping lodges are supplied with central dining halls and service buildings. Cafeterias are maintained in connection with automobile camps. All hotels and camps, while operated privately, are under the supervision of the National Park Service. Transportation for rail travelers at rates fixed by the park service is provided by a private concern which maintains a large fleet of motor buses.

Yellowstone National Park constitutes one of the world's largest wild animal refuges and among its inhabitants are deer, bear, antelope, elk, mountain sheep, moose and buffalo. The largest of the buffalo herds is that on the Lamar river with 985 head at the last count, of which 176 were calves of the 1932 crop. The elk population of the park early in 1933 was 13,795.

The waters of the park abound in fish, mainly trout and grayling. The trout often attain large size, especially in Yellowstone lake where they may be taken from boats. The day's limit per person is 10 fish.

The park is under the direct charge of a superintendent with headquarters at Mammoth Hot Springs, five miles from the north entrance at Gardiner, Montana. This is the official quarters for the park ranger and naturalist service and is also used as the central office location for the private companies operating the hotel, camp and transportation concessions. An official bureau of information is located near the office of the superintendent for the accommodation of tourists. A museum of natural history of the park is maintained in connection with the bureau with four trailside museums at various points in the park.

Under the direction of the superintendent a permanent ranger force is maintained, composed of men who are trained to enforce the rules of the park and who are skillful in woodcraft and in forest fire fighting. During the tourist season the force is augmented by temporary rangers whose duty it is to protect the natural attractions of the park. The rangers and naturalists act in the capacity of hosts to park visitors by guiding parties and conveying general information.

In 1932 Yellowstone Park was visited by 157,000 persons.

UNIVERSITY AND COLLEGES

Numerous Institutions of Higher Learning, Headed by University of Montana, are Maintained to Give Youth Every Advantage Possible

FOR a young and sparsely settled state, Montana is very well equipped with institutions of higher learning of which the University of Montana, with its six widely scattered units, is very greatly in the lead in the matter of enrollment and by reason of extensive support through state tax moneys is able to provide a high standard of instruction.

The State University was opened at Missoula in 1895. This institution includes the College of Arts and Sciences, the School of Law, the School of Pharmacy, the School of Forestry, the School of Journalism, the School of Music, the School of Business Administration, the School of Education and the Public Service Division.

The State College at Bozeman began its work in 1893. The resident instruction includes the College of Agriculture, the College of Engineering, the College of Science, and the College of Household and Industrial Arts. The research division embraces the Engineering Experiment Station and the Agricultural Experiment Station. Besides the central experiment station for agriculture there are branch stations at Havre, Moccasin, Corvallis, Huntley and Miles City. The third division of the State College is the cooperative extension work in agriculture and home economics, which carries on extension work through county and district extension agents under the direction of specialists, leaders and a state director.

The Montana School of Mines received its first class at Butte in 1900. The Bureau of Mines and Geology was added to the school in 1919. In 1897 the State Normal College was opened at Dillon.

Under a Unified System

In 1916 these four institutions were combined into the University of Montana with a chancellor as its chief executive officer, whose office was at the state capitol in Helena, and whose work was taken over July 1, 1933, by an executive secretary to the state board of education,

In 1927 the Eastern State Normal School was opened at Billings, and in 1929 the Northern Montana College at Havre became the sixth unit of the University of Montana. The instructional, research and extension staffs of the University of Montana include over four hundred persons.

During the past year 5,400 people received instruction in residence at the various units of the University of Montana, and 1,450 students were enrolled in correspondence courses. Seven hundred eighty students were graduated from the University of Montana in 1932.

Private Schools and Colleges

That the citizens of Montana give due cognizance to the need for spiritual as well as material training of the youth of the state is evidenced by the fact that in addition to the splendid public school system there are numerous schools and colleges under the auspices of various denominations.

In Helena is located Intermountain Union College with an enrollment of 140 students per quarter. This college, conducted under the combined auspices of the Presbyterian and Methodist churches, is a college of liberal arts, leading to an A. B. degree.

In the valley adjacent to Helena is located the Deaconess school for younger children, in which classes from the first grade to high school, are taught. This school which is conducted by the Methodist deaconesses has an enrollment of 63 boys and girls.

Adjacent to Billings is the Billings Polytechnic Institute and Junior College, a school established 25 years ago and maintained in a truly Christian atmosphere. The courses offered include high school, pre-professional, commercial college, vocations, music and a religious training school. The average annual enrollment is 350 students.

Catholic Educational Institutions

The largest school system outside of the public schools is that maintained by the Catholic church.

Carroll College (for men) is located in Helena and carries four years of high school, four years of college and pre-professional courses and a preparatory seminary course. The average enrollment is 70 in the high school and 135 in college.

A college for women, St. Mary's Institute, operated in connection with Mt. St. Mary's Academy, is located in Great Falls and has an enrollment of 215.

A very fine industrial school, St. Mary's of the Mount, conducted by the Sisters of the Good Shepherd, is located in Helena. The average enrollment is 90.

In addition to these colleges there are eight academies and 33 parochial schools with a total enrollment in 1933 of 7,371. The courses of study in the parochial schools conforms to the high standard maintained in the public schools, supplemented by the study and practice of religion.

There are also eight Indian schools with an enrollment of 715, and three orphans homes with an enrollment of 225, approximately 200 of these children being in school.

The total number of students being educated in the Catholic schools of this state for the school year 1932-33, is 8,544.

NATURAL GAS RESERVOIRS

Several Fields Developed Within Past 15 Years—Fuel is Distributed Through Hundreds of Miles of Mains to Leading Cities

THE use of natural gas in Montana has gradually developed during the last 15 years but the largest development has taken place during the last two years.

The city of Billings, together with several nearby smaller towns, is supplied from the Elk Basin field in northern Wyoming. Miles City, Terry, Glendive and Sidney are supplied from the Baker field in the extreme eastern end of the state. Malta and Glasgow and adjacent towns are supplied from the Bowdoin field, and the Havre-Chinook district is supplied from the Bowes field. Gas from the Kevin-Sunburst field is piped to Shelby, Conrad, Choteau, and Great Falls.

In 1931 the Montana Power Company undertook two natural gas projects. The first involved bringing gas from the Dry Creek field near Red Lodge to the towns of Red Lodge, Roberts, Absarokee, Columbus, Big Timber, Livingston and Bozeman. The second, which was by far the larger of the two projects, involved bringing gas from the Cut Bank field to Helena, East Helena, Deer Lodge, Anaconda and Butte.

The Dry Creek-Bozeman pipe line is made of 10 inch pipe and is 138 miles long including branches. The line from the Cut Bank field to Butte and Anaconda is made of 20 inch pipe and is 267 miles long, including branches. In the first full year of operation these two pipe lines transmitted four billion cubic feet of gas.

This gas, in addition to being generally used for heating purposes in the towns enumerated above, supplies the entire fuel requirements of the Anaconda Copper Mining Company at its Butte mines and at its smelter in Anaconda and the fuel requirements of the American Smelting and Refining Company at East Helena. It also supplies the state institutions at Warm Springs, Galen and Deer Lodge as well as the State Capitol and the U. S. Veterans' Hospital at Helena, the School of Mines at Butte, and the State College at Bozeman.

MONTANA'S SCHOOL SYSTEM

Approximately 120,000 Pupils Enrolled in Public Schools of the State—High Standard of Educational Work is Maintained

By ELIZABETH IRELAND
Superintendent of Public Instruction

IN a state of such magnificent extent as Montana, with her progressive citizenry of pioneer covered-wagon days, with her great natural resources, varied industries, and small school population, averaging only one pupil for each square mile of surface, one would naturally expect a strong school system. Out of a population of 537,606, there are 119,134 pupils enrolled in the schools. Montana has always been proud of, has been devoted to, and has given generous support for, her common schools, her high school system, and her six units of the Greater University.

Up to the present time the common schools and high schools have not been seriously handicapped and are carrying on with very few shortened terms or with lowered standards or lessened efficiency. This may partly be due to the fact that for the past few years all the schools have been operating under a rather strict school budget system which has tended toward a more careful and judicious expenditure of the available school revenue and which has kept yearly school expenditures within yearly school incomes. There are some weak spots but by cutting out the non-essentials and by calling a halt on proposed new departures and expansion programs, by retaining the things that have been imperative and vital and by dropping those things that were merely desirable and attractive, the efficiency of Montana school systems has, up to the present time, withstood the present financial and economic strain remarkably well. During the past completed (1931-32) school year 98 per cent of the rural schools and all the graded and high schools have maintained a term of nine months. The present certification law has been re-written requiring in the very near future normal graduation as the minimum preparation for every elementary and rural teacher and college graduation for high school teachers. Practically all of the teachers of the state at present, approximate these standards.

High school education in Montana is one of the dynamic forces of the state. Of the approximate 120,000 pupils enrolled in the entire school system, in round numbers 30,000 or 25 per cent are in the public and private high schools. Practically all pupils eligible for high school are enrolled and in attendance. The high school curriculum is rather broad and varied, including not only the academic subjects, but the cultural and vocational, with emphasis on the Smith-Hughes agriculture, home economics, and trade courses. High school education in Montana is no longer a local district proposition, but all the high schools are supported mainly by a county-wide high school tax with a limited reimbursement from the state. A high school student is free to attend, without tuition, any high school within the county of his residence. There is liberal provision for transfer of high school students from county to county, the tuition being paid by the county of his residence.

The policy of the office of the State Superintendent of Public Instruction for the supervision and administration of the Montana school system is as follows:

1. To cooperate with the parents, school authorities, and taxpayers to provide good schools for all Montana children.

2. With the cooperation of the parents, to provide for every rural child a standard rural school, taught by a teacher who is a normal graduate or the equivalent.

3. With the cooperation of the parents, to make high school education accessible to all rural eighth grade graduates as well as to graduates of the city and village elementary schools.

4. To eliminate from the school program those things that are merely attractive or desirable and retain those that are vital and essential.

5. To urge the employment of Montana teachers where the training is equal or equivalent to that of teachers from outside the state.

6. To carry into successful operation the new elementary and high school courses of study, and the new high school code, so that Montana schools will have a curriculum, modern and progressive.

7. To work out the school budget law to more successful operation so that all school districts will keep within their yearly incomes, so that the school finances will be on a sound financial basis as a protection to the education of the children, the teachers, and superintendents who are employed, the taxpayers, and those investing in school securities.

8. To continue to work for state support for schools, from other sources to relieve over-burdened visible property.

In this summary of the situation in Montana, of the school system, it has been the plan of this article to make plain that Montana has wide and varied resources, that the people of Montana believe in education and their school system, that the school population is very small in comparison with the wealth back of each child to be educated, that the people have supported, generously and well, their schools, and that while some curtailments have been made, all the flags of the educational system in Montana are still up.

HORTICULTURE IN MONTANA

By GEORGE L. KNIGHT, State Horticulturist

HORTICULTURE in Montana in relation to the size of the state is a comparatively small industry but in relation to the area in which horticultural crops are being grown the industry is large and with every element of increase. The present development in horticultural crops is particularly along the line of vegetables and of sweet and sour cherries. The only extensive planting of trees in the northwest in the past few years have been in the vicinity of Flathead lake where large plantings of both sweet and sour cherries have been made, and where large tracts of land are being cleared and made ready for planting in 1933 and in the years to come.

Large acreages in the vicinity of Missoula and throughout the Bitter Root valley are being devoted to vegetable crops, and marketing organizations with large memberships have been formed in Cascade, Flathead, Lake and Missoula counties and in the Bitter Root valley. The organizations are being incorporated with the intention of forming a central organization covering the entire state. The object of these organizations is the adoption of grades of the various products, as provided in the Session Laws of 1933; the adoption and use of trade marks and brands uniform throughout the state and featuring of the word "Montana"; the advertising of Montana products and proving through grading and standardization that any article bearing a Montana label is a quality product; and by various ways, particularly through horticultural exhibits at fairs to promote the development of Montana markets for Montana products.

Heavy Plantings of Fruit Trees

Heavier plantings of apple trees were made in 1933 than had been made in many years, to be followed by extensive plantings of pears, plums, prunes and apricots.

Strawberries, which have had many ups and downs during the past years, seem to have become stabilized and plantings are increasing with better quality being used and better cultural methods adopted. With the adoption of grades and standard pack the future of this industry looks brighter than at any time in the past.

The future of Montana's agriculture lies largely in the development of her irrigated valleys and this must come through the development of higher yielding and higher priced crops such as horticultural crops; standardization of these products through grade and pack, and development of markets based on such grades and packs and advertising of brands representing them.

The high quality of Montana's horticultural products when backed by high standards of grade and pack, cooperative marketing and thorough distribution cannot but bring prosperity to the areas in which the growing of these crops is possible.

WATER POWER RESOURCES

*State Has Potential Water Power of 2,550,000 Horsepower—Of
This 400,000 Horsepower is Developed—Industrial
and Domestic Uses*

MONTANA is unique in that within its borders originate the headwaters of rivers flowing respectively into the Gulf of Mexico, Hudson's Bay, and the Pacific ocean. The Madison, Jefferson and Gallatin rivers combine at Three Forks to form the Missouri which, flowing first north, then east, then south, joins the Mississippi near St. Louis. The Yellowstone river, rising in Yellowstone National Park, flows in a northeasterly direction and joins the Missouri at a point near the Montana-North Dakota state line.

The Waterton and St. Mary rivers, rising in Glacier National Park, flow into the Saskatchewan and thence into Hudson's bay.

Silver Bow creek, which is formed largely by water pumped from the Butte mines, flows in a westerly direction and is progressively known as the Deer Lodge river, Missoula river, and finally Clark Fork river. The Clark Fork river is one of the principal tributaries of the Columbia river.

The Mississippi together with its principal tributary, the Missouri, forms the longest river in the United States. The Columbia is the largest in point of volume. These great rivers, rising in the main range of the Rockies at elevations of over 5,000 feet, provide a very large potential water power.



A HYDRO-ELECTRIC PLANT ON THE MISSOURI RIVER

It is estimated that the total potential power available in Montana amounts to 2,550,000 horsepower. Of this total 400,000 horsepower has been developed and is now being distributed by several companies operating in the central and western parts of the state. The Montana Power Company is the largest of these operators and has 11 water power plants on the Missouri river and its tributaries, on the Clark Fork river, and on the West Rosebud creek, tributary to the Yellowstone.

Early Developments

The first water power plant of importance in the state was built on the Black Eagle falls of the Missouri river, near the city of Great Falls, in 1891. It had a capacity of 8,000 horsepower and supplied power to the Boston & Montana smelter, which was located on one side of the river near the falls, and to the city of Great Falls, located on the other side of the river.

In 1898 plants were built at Canyon Ferry on the Missouri river, 17 miles from Helena, and on the Big Hole river, 21 miles from Butte.

These three early plants, supplying power respectively to Great Falls, Helena, and Butte, and built at a time when the transmission of power by electricity was in its infancy, formed the nucleus of the Montana Power Company's system, which has now become one of the great power systems of the country.

Later Developments

In the following years additional plants were built on the Missouri river at Hauser lake, Holter, and at Great Falls, on the Madison river near Norris, on the Clark Fork river at Thompson Falls, and on the West Rosebud creek at Mystic Lake. The combined capacity of all these plants now amounts to 390,000 horsepower.

All the plants of the Montana Power Company are inter-connected by a system of high voltage lines which aggregate 2,800 miles in length and distribute power to 137 towns and 63,000 customers in the state.

Utilization of Power

The largest single power consuming industry in the state is metal mining and reduction. The plants of the Anaconda Copper Mining Company and other mining and smelting companies in Butte, Anaconda, East Helena and Great Falls consume over 200,000 horsepower.

The next largest class of power users are the electrified railways, which take some 40,000 horsepower.

In addition to these, large amounts of power are used for mining coal at the mines at Bear Creek, Roundup, Sand Coulee, and Stockett. An interesting development in this line is the recently developed open pit strip mine of the Northern Pacific Railway Company at Colstrip, Montana, 100 miles east of Billings. At this point there is a single vein of coal 28 feet thick, which lies about 20 or 30 feet below the surface. This coal is being mined with electric shovels and is used by the Northern Pacific railway for the operation of several hundred miles of its main line.

Power is used in considerable quantities for pumping water, both for irrigation and for city water supply. The city water supply for Butte is largely supplied by pumping from the Big Hole river with electric power, and the cities of Billings, Livingston, Great Falls and several smaller towns are entirely dependent upon electric power for their water supply. Four thousand horsepower is used in the Prickly Pear valley for irrigation, and large amounts are used also in the vicinity of Billings and Great Falls for the same purpose. Electric power is used throughout the state for the operation of grain elevators, flour mills, and a considerable amount is taken by the sugar factories at Billings and at Chinook.

PUBLIC LANDS WITHIN MONTANA

State Has for Disposal Nearly 5,000,000 Acres—Federal Government Holdings Available for Filing Aggregate 6,238,429 Acres

THE State of Montana holds nearly 5,000,000 acres of land, the remainder of that set over to it by federal grants made since it was admitted to statehood, which are being administered by the state board of land commissioners through the commissioner of state lands and investments. These lands, which were granted to aid the state in several purposes, mainly the support of its common schools and institutions of higher learning, are held for sale or lease and the receipts are placed in permanent, interest earning funds.

These lands are well scattered over the state, are available for purchase only at public auction sales and cannot be disposed of for less than \$10 per acre for agricultural land or \$5 per acre for grazing land.

Since Montana became a state up to the close of the fiscal year 1932, the state had sold 1,587,488 acres of these lands for \$24,613,755.27, or an average of \$15.50 per acre, and on June 30, 1932, it still held title to 4,686,412 acres of the original grants, of which 2,763,057 acres were leased to stockmen and farmers. Of this leased area 2,549,218 acres were classed as grazing land, 32,709 acres were leased for agricultural purposes and 181,130 acres were under crop share leases. In addition 46,708 acres were under lease for oil and gas development, 4,182 acres for coal mining and 695 acres for other mining operations.

Since the discovery of oil and gas in Montana the state has received nearly \$2,000,000 in oil and gas and coal rentals and royalties from state lands, viz: Dec. 1, 1918 to June 30, 1932, rentals and royalties on coal leases \$58,486.73; rentals on oil and gas leases \$693,540.23; oil and gas royalties \$1,090,265.88, total \$1,842,292.84.

Government Land Open for Homesteading

Every county in the state contains some government land, part of the public domain. As of July 1, 1932, the unappropriated and unreserved public land available for filing aggregated 6,238,429 acres, of which all but 87,020 acres had been surveyed. Much of this land is rough or mountainous, of value chiefly for grazing, although considerable in the prairie counties is classified as farming or agricultural land. District land offices are located at Great Falls and Billings with the office of the chief inspector in Helena.

All unappropriated surveyed public lands adaptable to any agricultural use are subject to homestead entry if not mineral or saline in character, or not occupied for the purposes of trade or business and have not been embraced within the limits of any withdrawal, reservation or incorporated town or city.

Homestead entries may be made for 160 acres, but may be for 320 acres in certain areas designated as nonmineral, nontimbered or nonirrigable, or for 640 acres in certain areas designated as "stock raising lands."

A homestead entryman must be 21 years old, or the head of a family. He must be a citizen of the U. S., or having declared his intention to become a citizen, who is not the owner of more than 160 acres; must establish a residence upon the land within six months of entry and maintain such residence for three years, and must not absent himself from the lands for more than two periods aggregating not in excess of five months during any one year before making final proof. Filing fees of \$5 for less than 81 acres, or \$10 if more than 81 acres, must be paid at the time of entry. Preference rights are available to soldiers and sailors honorably discharged from the service.

Acreages of unappropriated and unreserved government lands within each of the 56 counties of Montana, as listed by the U. S. general land office on July 1, 1932, were as follows:

Beaverhead	494,312	Golden Valley	9,965	Powder River.....	146,990
Big Horn	33,058	Granite	44,017	Powell	71,019
Blaine	28,213	Hill	21,322	Prairie	37,883
Broadwater	58,518	Jefferson	66,634	Ravalli	12,534
Carbon	202,754	Judith Basin.....	12,179	Richland	48,443
Carter	380,976	Lake	3,160	Roosevelt	37,672
Cascade	31,173	Lewis & Clark.....	69,832	Rosebud	229,973
Chouteau	100,645	Liberty	12,152	Sanders	30,927
Custer	182,410	Lincoln	8,773	Sheridan	12,041
Daniels	7,718	McCone	227,970	Silver Bow	43,687
Deer Lodge	28,516	Madison	185,463	Stillwater	7,502
Dawson	51,213	Meagher	14,172	Sweet Grass.....	13,086
Fallon	37,912	Mineral	4,410	Teton	12,578
Fergus	225,589	Missoula	48,683	Toole	44,443
Flathead	12,637	Musselshell	21,560	Treasure	12,559
Gallatin	19,404	Park	18,290	Valley	753,711
Garfield	712,574	Petroleum	202,730	Wheatland	2,959
Glacier	3,428	Phillips	860,171	Wibaux	23,957
		Pondera	11,481	Yellowstone	11,401



A MONTANA GRAIN FIELD

STATE MAINTAINED INSTITUTIONS

Wards of the Commonwealth are Cared for in Many Modern Establishments—Large Sums Annually Expended for Betterment of Condition of the Unfortunates

MONTANA'S institutions which form a part of the state government are administered in the same high class manner that governs the conduct of all departments of state. It has ever been the aim of those in authority to select men and women of the highest type, and with special training along these particular lines, to entrust with the care and education of those confined within the various state institutions. The course of study in all schools is under the supervision of the State Board of Education.

Tuberculosis Sanitarium

The Montana State Tuberculosis Sanitarium located at Galen, Deer Lodge county, came into existence through the concerted efforts of the Montana Federation of Women's Clubs, aided by public-spirited citizens. The law creating the institution was passed at the 1911 session.

In the 10-year period, 1922 to 1932, the number of patients treated each year ranged from 270 to 323. At the close of the fiscal year June 30, 1932, there were 144 patients in the hospital, 46 of whom were below the age of 20. Approximately 22 per cent of the patients admitted suffer from what is commonly known as "miner's consumption."

The success of the treatments followed is reflected in the progressively falling death rate with a progressive increase in the number of patients discharged as "arrested" or "improved."

During the biennium ending June 30, 1932, 220 patients were discharged from the institution, of which the conditions of 192 were listed as improved, quiescent or arrested, and only 28 as unimproved. Deaths of patients were held to 72 and of these the disease was far advanced in the cases of 60 at the time of their admissions. Nearly 50 per cent of the deaths were due to miner's consumption, non-infectious but rarely curable.

Soldiers' Home

The Montana State Soldiers' Home, located near Columbia Falls, Flathead county, the object of which is to provide a home and subsistence to honorably discharged soldiers, sailors and marines of the United States army or navy who are through disability or age in need of assistance, was established through action of the legislative session of 1895. In 1903 the law was amended to include wives, under certain conditions.

At the beginning of 1933 the home sheltered 66 guests. The location and grounds are considered one of the beauty spots of the state. The home is operated as far as possible along military lines and no work is performed by any one other than paid employees. The pensions received range from \$12.50 to over \$100 per month.

A fine farm is operated in connection with the home which supplies all of the fruit, vegetables, dairy and poultry products and meats consumed. The per capita cost of operation is \$1.81 per day.

Orphans' Home

The Orphans' Home located at Twin Bridges, Madison county, is approximately 40 years old, having been established through a law passed in 1893. Here 250 dependent children are cared for in an atmosphere as homelike as is possible. The cottage system is employed with a housemother for each group of children. Education is from the kindergarten through high school, the latter being supplied by the Madison county high school.

In addition to the school work the girls are trained in sewing, cooking and nursing; the boys work on the farm and assist in the kitchen and laundry. There is also a boys' and girls' glee club and a band of 40 pieces. Sports of all kinds and entertainments are provided as a means of recreation. Religious services are held every Sunday and occasionally the children attend church in Twin Bridges.

School for the Deaf, and the Blind

The School for the Deaf and Blind, located at Boulder, Jefferson county, was established by a law passed in 1895 and was known as the Montana School for the Deaf and Dumb. To this school was also admitted children classed as feeble-minded. In 1903 the law was amended changing the name to the Montana School for the Deaf and Blind, and in 1919 the law was further amended segregating the feeble-minded and establishing the Montana Training School for the Feeble-Minded, under the supervision of the School for the Deaf and the Blind.

The average enrollment in the School for the Deaf and the Blind is 100, there being about four deaf children to every blind child. Specially trained teachers preside in the school rooms and supervise the recreation periods, while supervisors and housemothers care for the children at other times. The same high standard prevails here that is evident in all of Montana's state institutions. The children ranging in age from six to 21, are taught the regular school subjects and in addition the girls learn the domestic arts, the boys are taught the printing trade in all branches, also broom and mop making and manual training. Both boys and girls are taught music. Many of the graduates of this school are self-supporting: two boys have passed the state bar examination; some of the former pupils are now employed as teachers. Education of the deaf and blind is compulsory in Montana.

The farm operated by the pupils of the feeble-minded department furnishes much of the food used. Modern buildings with all conveniences provide a comfortable home for these afflicted children.

Training School for the Feeble Minded

The Training School for the Feeble-Minded, which is a division of the School for the Deaf and Blind was established in 1919. The modern buildings comprising this school are located about one-half mile from the School for the Deaf and Blind. Here are housed the 368 inmates, including a number of adults.

The cottage system is employed and the children grouped as to age and sex, each cottage being in charge of a housemother. The children capable of receiving an education are schooled to the extent of their mental capacity. Some of the children are what are known as "custodial" cases, incapable of education. The older boys of low mentality are taught farm work. They raise the vegetables used in the entire institution, care for the dairy herds and attend to the poultry raising. The Montana law provides for the reception of adults in this school, and the retaining of pupils who have attained legal age.

The older boys work in the power plant and the laundry, while the girls are taught sewing, basket weaving and such household tasks as they are capable of performing. The per capita cost of operating the two schools is \$1.17 per day.

Vocational School for Girls

The State Vocational School for Girls is located about 12 miles northeast of Helena, in the beautiful Prickly Pear valley. Prior to the establishment of this school following the passage of the law in 1919, the girls were sent to Miles City to what was then known as the State Reform School.

The present Vocational School is composed of a group of modern brick buildings. The grounds surrounding the buildings are attractive with lawns, trees, flowers and shrubs. The farm operated in connection with the school supplies much in the way of vegetables, dairy products, meats and feed for livestock.

The average number of girls is about 80. The policy of the school is to provide a real home and all-day schooling is one of the requisites. In addition to the regular grade and high school work, the girls are taught commercial subjects, cooking, sewing, home making, millinery and beauty culture. Music, both orchestral and choral, forms an important part of the curriculum.

The fine results obtained in this school reflect credit upon the efficient management and corps of teacher. The per capita operating expense is \$1.87 per day.

Industrial School for Boys

The Industrial School for Boys located in Miles City, Custer county, was established pursuant to a law passed in 1893. Here those unfortunate boys who through lack of wise guidance or training are potential law breakers are confined until they are 21 years of age, unless earlier paroled. This school plays a big part in the rehabilitation of the youth of the state needing special attention. The average population of the school is 150. There were 239 boys on parole in 1933 who each month were required to report in writing to the school.

The boys are in school half of each day and devote the other half day to work in the shops or on the farm. During 1932, 18 boys attended Custer county high school. Printing, shoemaking, carpentry and auto mechanics are regularly taught in the shops, where all the school needs in those lines are manufactured.

The Industrial School band is outstanding and has many times accepted outside invitations to play. Some of the boys contribute their services as singers in the local churches.

Boys not trained in the shops are employed on the school farm where most of the vegetables, poultry, dairy products and meat are produced. The per capita cost of operating the school is estimated at \$1.20 per day.

State Hospital for the Insane

The hospital for the insane was first opened at Warm Springs, Deer Lodge county, in 1877 as a private institution. It continued thus until 1912 when it was purchased by the state. In addition to the insane the hospital accepts epileptics, drug addicts and inebriates.

The average number of patients is 1,600. Included in this number are veterans of the Civil War, Spanish American War and the World War, there being 56 of the latter in 1933.

A large staff of specialists cares for the needs of the patients and many are discharged each year either cured or greatly improved. The per capita cost of operating the hospital is approximately 66 cents per day.

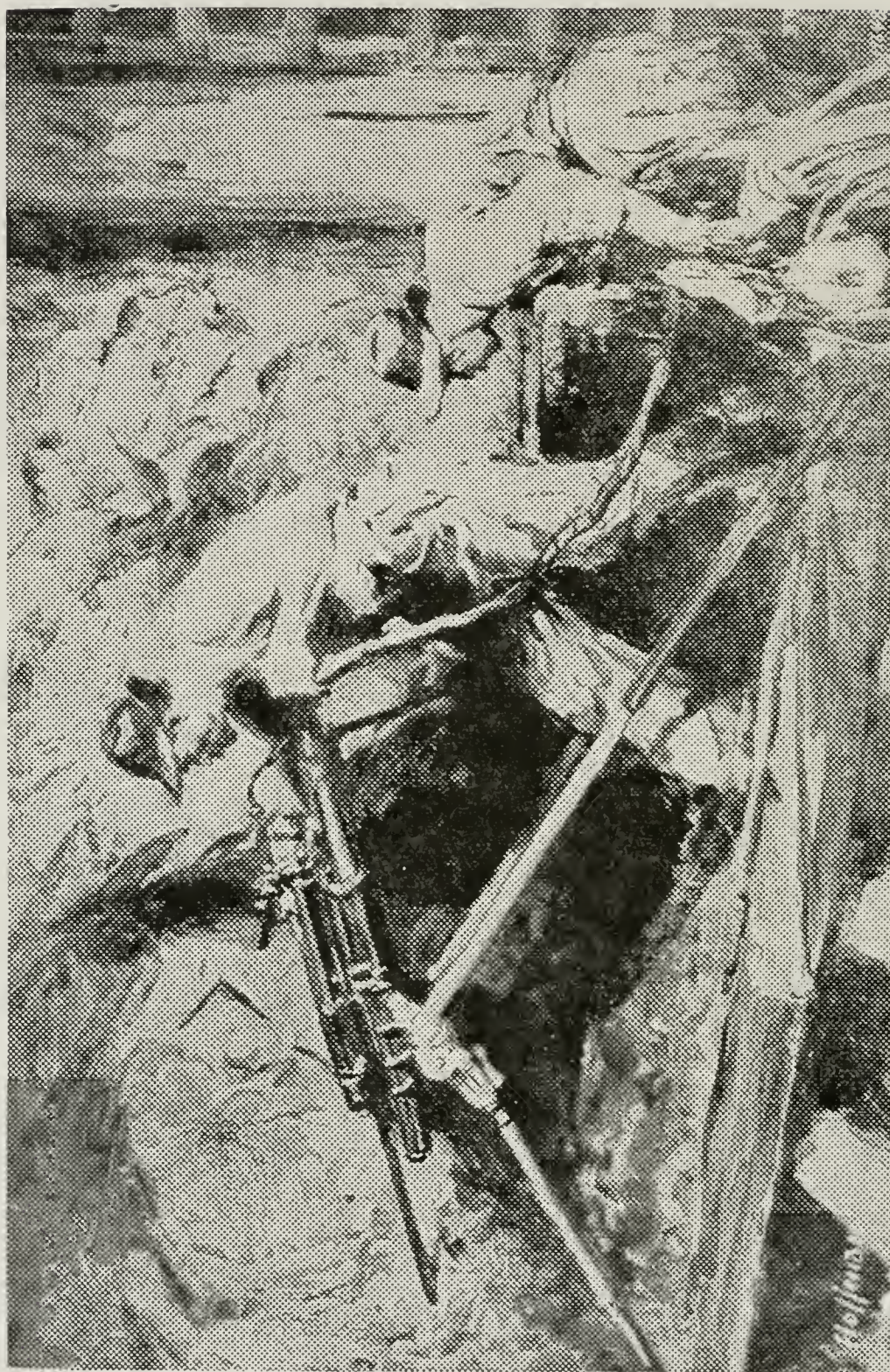
State Prison

The state prison at Deer Lodge, Powell county, has an average of 600 prisoners ranging in age from 16 to over 70. That all are not constitutionally criminal is evidenced by the fact that in the period July 1, 1931 to June 30, 1932, 273 were paroled.

A model farm is operated in connection with the prison on which the work is performed by trustees, and this supplies most of the vegetables, dairy products, meats and poultry products required by the institution.

The state auto license plate factory was established in the prison several years ago. Carpentry, shoe repairing, plumbing, and vulcanizing shops in which the men are taught trades are maintained. In the garment factory are made all of the clothes worn by the inmates. The prisoners do all of the work in connection with the kitchen and dining room, bakery and laundry.

The prison band plays at stated times in the prison theater and is outstanding in its performance. In the library 4,305 volumes are at the disposal of the inmates. An up-to-date hospital and competent physicians care for their bodily ills. Sunday religious services are conducted by various denominations. The per capita cost of maintenance is 84 cents per day.



MINERS OPERATING AIR DRILLS IN A MONTANA MINE

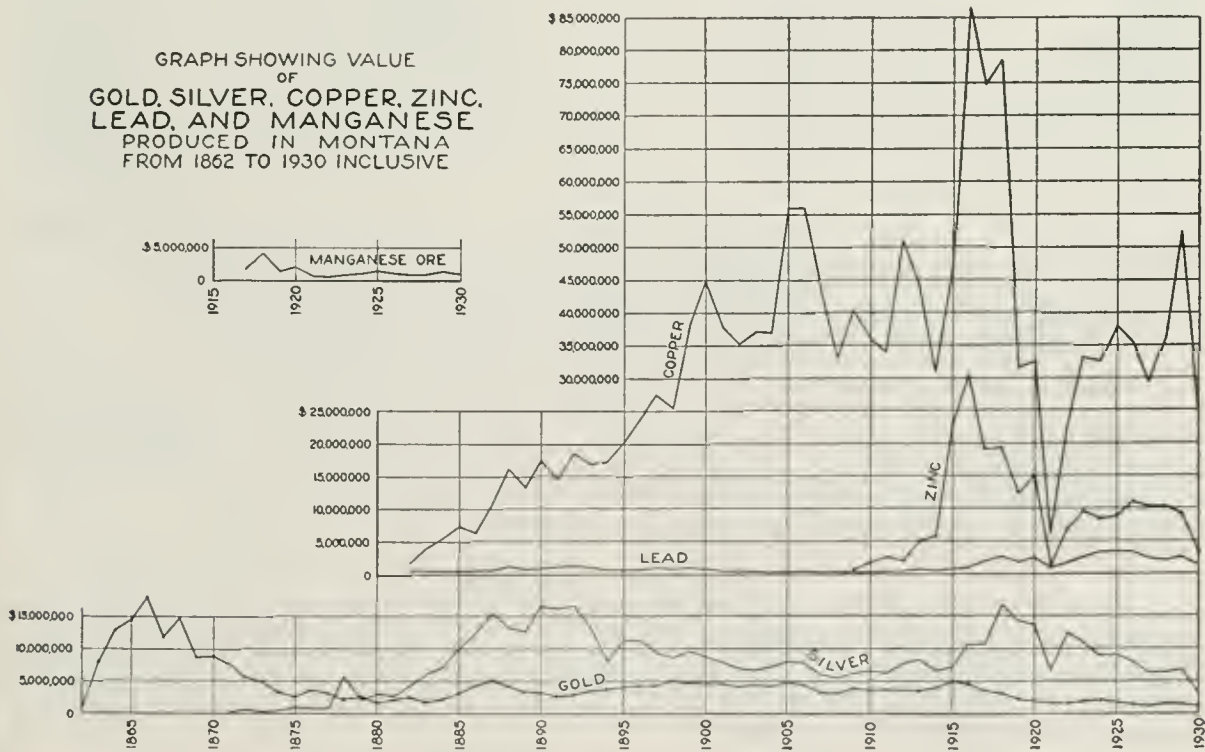
MINERAL INDUSTRY *of* MONTANA

State Has Yielded Mineral Products Valued at More Than Three Billion Dollars—Untold Millions in Wealth Remain Still Untouched

By EUGENE S. PERRY, Professor of Geology,
Montana School of Mines

MONTANA has a wealth of varied mineral resources. More than 25 different natural products have been recovered from the mountains and plains of this state and many more are to be had when economic conditions favor their exploitation. During the last decade the total value of the products of the mineral industry was greater than either the value of manufactured products or the value of livestock marketed.

The history of mining dates back to 1862 when the discovery of placer gold on Gold Creek, west of Garrison, followed by the discovery of other rich placer deposits at Bannack, Virginia City, and Last Chance Gulch, made known to the world the richness of this region. Thousands of miners and many adventurers drifted in from the mining districts of Colorado and California, and from eastern United States. There followed a conflict between honest effort and enterprise on the one hand, and banditry and lawlessness on the other, which finally resulted in the organization of the famous Vigilante committee and a consequent observance of law and order.



The seats of early government naturally were in the centers of economic enterprise which explains the location of the territorial capital first at Bannack, then at Virginia City. The capital was moved to Helena in 1874.

Chief Mineral Products of the State

The chief mineral products listed in order of their relative importance are as follows: copper, zinc, coal, petroleum, natural gas, silver, lead, manganese, cement, and gold. Other products of lesser importance are arsenic, cadmium, building stone and crushed rock, sand and gravel, clay products, phosphate rock, gypsum, vermiculite, tungsten, gems, calcite, and mineral water. Besides these products, which are actively recovered, are reserves of potential economic products some of which are chromium, iron, asbestos, bentonite, corundum, abrasive garnet, feldspar, and sheet mica.

Deposits of the products just listed are scattered state wide, and no county is without some natural resource. Metal mining is confined to mountain areas, but mountains are found in most of the western half of the state—a region larger than the New England states combined. Coal occurs in 90 per cent of the counties. Oil and gas come from 15 separate fields widely scattered throughout the plains area. Unlimited amounts of cement material, sand and gravel, and building stone are to be had in most parts of the state.

The products of the mineral industry can readily be divided into metallic and nonmetallic minerals. The following table shows the value of mineral production for Montana.

Mineral production of Montana from 1862 to 1931 inclusive. (Compiled by Uno M. Sahinen, Statistician, Montana Bureau of Mines and Geology.)

Metallic Products		Quantity	Value
Gold	1862 to 1931 inclusive	.....	\$ 302,634,297
Silver	1869 to 1931 "	645,988,013 ounces	479,868,355
Copper	1882 to 1931 "	10,315,971.758 pounds	1,576,950,073
Lead	1882 to 1931 "	937,344,078 "	52,083,497
Zinc	1905 to 1931 "	2,695,177,162 "	215,286,771
Manganese ore	1916 to 1931 "	745,712 long tons	18,663,492
Total major metallies.....			\$ 2,645,486,485

Nonmetallic Products			
Coal	1882 to 1931 inclusive	98,972,787 short tons	215,704,100
Coke*	1884 to 1912 "	1,040,890 " "	7,065,483
Petroleum	1915 to 1931 "	41,249,000 barrels	52,124,119
Natural Gas**	1915 to 1930 "	40,738,563 M. cu. ft.	9,659,158
Gems***	1890 to 1927 "	.....	2,790,899
Clay products**	1894 to 1930 "	.....	12,330,616
Sand & Gravel	1906 to 1931 "	12,701,164 short tons	4,228,057
Stone**	1888 to 1930 "	.....	8,501,664
Total nonmetallic products.....			\$ 312,404,096

Miscellaneous products: (includes the minor metals; cadmium, tungsten, antimony, iron ore, ferro-alloys, molybdenum, and the nonmetallic products; arsenious oxide, asbestos, cement, coal tar, carbon black, corundum, flint, graphite, grindstones, gypsum, mineral water, phosphate rock, sulphuric acid, and quartz.....\$ 38,000,000

Grand Total, metallics and non metallics.....\$2,995,890,581

*Tabulation of coke production discontinued after 1912.

**Figures for 1931 not available.

***Canvass of statistics discontinued after 1927.

Metals of Montana

The story of metal mining in Montana is rich with adventure—individual enterprise; sometimes preceding success and the massing of great fortunes, sometimes ending in failure. It began with a wilderness; and the struggles for ownership, and the vicissitudes of development, if related, would equal in interest the history of a nation.

Most of Montana's metals occur in mixed ores, that is, from a single ore may be obtained several metals such as gold, silver, copper, zinc, lead, arsenic and perhaps others. This is not always the case for some ores may contain only gold, or zinc, or some other metal. Nearly all the ore occurs in steeply dipping veins but a few ore bodies are irregular in shape. All are in close proximity of igneous masses. Several mines are over 3,000 feet deep and one mine is over 4,000 feet deep.

The general geology of the metal deposits is not greatly different from that of other regions, although of course, in detail each area is individual. Most of the ore deposits resulted from emanations from igneous masses intruded during early Tertiary time. The mineralized "juices" from granitic masses deposited their load of metalliferous material mainly as veins in the host-rock of the intrusives, or within the intrusive itself after partial solidification. Limestone beds frequently were susceptible, but elsewhere ore minerals were deposited in limy shales or in quartzites or lava beds. The host rock ranges in age from pre-Cambrian to Tertiary, and includes many rock types.

Metal mining districts are widely scattered over nearly all of the mountain areas, even in those separated from the main ranges of the Rockies. In nearly all districts the mining of gold has been conspicuous, and most mining camps began as "gold camps." This is mainly because, in the weathering of a mineral vein, gold lags behind, and tends to concentrate either in the outcrop of the vein, or as placer deposits in streams which flow away from the mineralized area. Silver and sometimes copper, lead, and zinc also tends to become concentrated at the outcrop. Thus, in the first stages of mining, secondarily enriched deposits were generally encountered, and as mining proceeded in depth, the primary ores containing sulphide minerals of copper, zinc, lead and other metals were encountered.

The change in character of ores in depth necessitated a change in method of treatment. The deep lying sulphide ores could not be handled in the same manner as the shallow oxidized ores. In the early days of mining certain of the concentrating plants could not be readily adapted to the new types of ores, and as a consequence some mines were abandoned even though they still contained large bodies of ore.

The advance in ore treatment during the last two decades has made possible profitable working of many mineral deposits which in the early days of mining could not be successfully worked. Thus mines which may not have been successful with old methods may now be worthy of development.

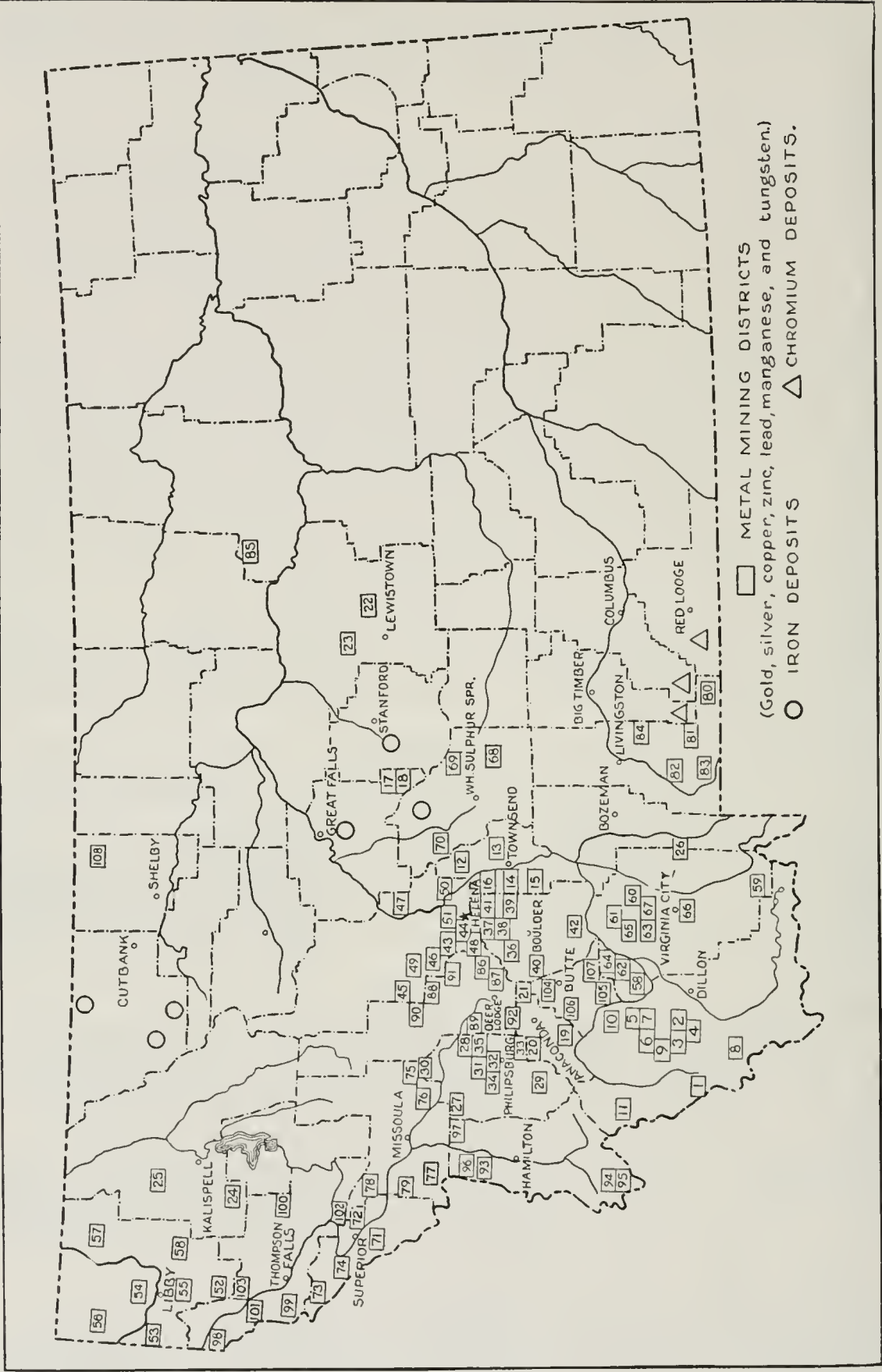
Although primarily a producer of copper, the production of zinc, silver, lead, manganese, and gold places Montana with other states leading in the production of these metals. And interestingly enough, the many bodies of ore, from which these metals are recovered, are far from being exhausted; new deposits of metals are being found from time to time. Hence, there is promise of a long life to the metal industry in this state.

The map on page 54 shows the distribution of the more important metal mining districts.

The copper period in Montana's mineral history began in 1880, when Marcus Daly, backed by Haggin, Hearst and Tevis, deepened the Anaconda mine at Butte from the 60-foot level to a little more than 100 feet and found, to the consternation of everybody but himself, that instead of silver he had struck copper.

In sharp contrast to the gloom of the old-timers and the pessimism of his partners, Daly was cheerful and optimistic. He contended stubbornly that the hill was rich in copper and urged the purchase of neighboring properties. He insisted that he was going to mine and ship enough high-grade ore to Swansea, Wales, to secure the money necessary to build a huge smelter, capable of treating the enormous deposit of copper ore which he claimed was hidden beneath the rugged contour of Butte hill.

Mining engineers west of the Mississippi not connected with the enterprise were skeptical. Half the people of Butte called him a visionary. Some thought he was crazy. Daly persisted. He bought up or leased many other properties, started operations on a big scale, and made Butte the greatest mining camp on earth.



METAL MINING DISTRICTS OF MONTANA

Today, three monuments vindicate Daly's vision and faith. One stands opposite the Federal building in Butte. It is a bronze replica of his face and figure, and one of the last masterpieces of August St. Gaudens. Another is the huge Anaconda Reduction Works, the largest non-ferrous smelter in the world, which incidentally, boasts the world's largest smoke stack, 585 feet high. The third is the Anaconda Copper Mining Company, the largest copper mining, smelting, refining and fabricating organization in the world, with 40,000 stockholders and properties in a dozen states and several foreign countries.

The Butte mining district, more properly known as the Summit Valley Mining district, lies at an elevation of about 6,000 feet within three miles of the continental divide and on the edge of one of those broad faulted intermontane valleys which are as characteristic of western Montana as the mountains themselves. During the 70 years of its continuously active existence this district has yielded copper, zinc, silver, lead, gold, and minor amounts of other metals. Developed in 1865 to 1870 as a gold placer mining camp, and from 1875 to 1885 as a silver mining camp, copper became the chief product after 1885.

Several hundred veins rich in several metals mentioned have been worked in an area about three miles wide by five miles long; and the Butte hill has deservedly earned the name of "the richest hill on earth." In general three main systems of veins are mined, but post-mineral faulting has complicated the pattern. An older vein system known as east-west or Anaconda, is intersected and offset by an intermediate aged system known as north-west or Blue. Near the close of the mineralizing period minor mineralization occurred in a system known as the northeast or Stewart. All veins are relatively steep dipping and occur in granite. Replacement of the wall rock by ore minerals resulted in ore bodies 50 to 100 feet in width. The oldest veins are most important.

Beaverhead county: 1—Ajax-Beaverhead, 2—Argenta-Blue Wing, 3—Bald Mountain, 4—Bannack, 5—Bryant-Lost Creek, 6—Elkhorn, 7—Mount Torrey-Utopia, 8—Horse Prairie, 9—Polaris, 10—Vipond, 11—Wisdom.
 Broadwater county: 12—Hellgate-Confederate Gulch, 13—Deep Creek, 14—Park-Townsend, 15—Radersburg, 16—Winston.
 Cascade county: 17—Hughesville, 18—Neihart.
 Deer Lodge county: 19—French Gulch, 20—Georgetown-Cable-Southern Cross, 21—Oro Fino.
 Fergus county: 22—Gilt Edge-Maiden, 23—North Moccasin.
 Flathead county: 24—Hog Heaven, 25—Whitefish.
 Gallatin county: 26—West Gallatin.
 Granite county: 27—Alps-Welcome Creek, 28—Dunkleburg, 29—Frog Pond-Moose Lake, 30—Garnet, 31—Henderson, 32—Philipsburg, 33—Red Lion, 34—Rock Creek, 35—South Boulder-Maxville.
 Jefferson county: 36—Basin-Boulder-Cataract, 37—Clancy-Lump Gulch, 38—Colorado-Amazon, 39—Elkhorn, 40—Elk Park, 41—McClellan Creek, 42—Whitehall.
 Lewis and Clark county: 43—Greenhorn, 44—Helena, 45—Lincoln, 46—Marysville-Bald Butte, 47—Mitchell-Wolf Creek, 48—Rimini, 49—Stemple-Gould, 50—Scratch-gravel, 51—York-Magpie Gulch.
 Lincoln county: 52—Cabinet, 53—Grouse Mountain, 54—Rainy Creek, 55—Snowshoe, 56—Sylvanite, 57—Tobacco River, 58—Wolf Creek.
 Madison county: 59—Madison, 60—Norris-Red Bluff, 61—Pony-Norwegian Creek-Mammoth-Renova-Sand Creek, 62—Rochester, 63—Sheridan, 64—Silver Star, 65—Tidal Wave, 66—Virginia City, 67—Washington.
 Meagher county: 68—Castle Mountain-Lennep-Murray, 69—Copperopolis, 70—Watson-Beaver Creek.
 Mineral county: 71—Cedar Creek-Quartz Creek, 72—Iron Mountain, 73—Saltese, 74—St. Regis.
 Missoula county: 75—Coloma, 76—Clinton-Wallace, 77—Mormon Creek, 78—Ninemile, 79—Petty Creek.
 Park County: 80—Cooke City-Horseshoe, 81—Cowles, 82—Emigrant, 83—Jardine, 84—Natural Bridge.
 Phillips county: 85—Little Rockies.
 Powell county: 86—Elliston, 87—Emery, 88—Finn, 89—Gold Creek, 90—Helmville, 91—Ophir-Blossburg, 92—Racetrack.
 Ravalli county: 93—Curlew, 94—Hughes Creek-Alta-Overwich, 95—Mineral Point, 96—Pleasant View, 97—Three Mile Creek.
 Sanders county: 98—Blue Creek-Heron, 99—Burns-Prospect Creek, 100—Camas Prairie, 101—Eagle-White Pine-Trout Creek, 102—Perma-Revais Creek-Spring Gulch, 103—Vermillion-Silver Butte.
 Silver Bow county: 104—Butte, 105—Divide Creek-Melrose, 106—German Gulch, 107—Highland-Moose Creek.
 Toole county: 108—Gold Butte.

Copper has been mined with profit in several other localities in Montana, chief of which is the Neihart district. As at Butte the production of copper has been in conjunction with the mining of other metals.

Montana has produced over ten billion pounds of copper worth more than one and one-half billion dollars.

Zinc

For nearly 20 years Montana has produced annually more than 100 million pounds of zinc, and in several years the annual production was greater than 200 million pounds. Again Butte leads all other districts in production, but valuable deposits of zinc occur in several other districts. The total production from Butte alone is greater than two and one-half billion pounds.

Early in the history of production, zinc because of refractoriness was considered a liability rather than an asset. Finally, in 1916, after years of research, metallurgists of the Anaconda Company devised a satisfactory electrolytic commercial method of extracting the metal with a purity of 99.9 per cent. It is stated that \$7,000,000 in cash were expended before profit was realized. Zinc produced in 1926 was valued at more than \$11,000,000 and in 1928 at more than \$10,000,000.

The principal ore mineral is zinc sulphide, sphalerite. It occurs in veins generally associated with other minerals, some of which are those of lead, manganese, and silver.

Counties other than Silver Bow (Butte) where zinc ores are found are Cascade, Jefferson, Lincoln, Granite, Madison, and Mineral.

Silver

Montana's era of silver mining began in 1865 when a rich vein of oxidized silver ore was discovered in the Travona claim west of Butte. Soon after other rich deposits were found, but not until 1875 was the ore successfully treated, at which time a ten-stamp mill and a furnace was erected, and the ore was subjected to chloridization, roasting and amalgamation. Other mills were soon built. Silver production in Montana reached a high point in the years 1887 to 1892, and again in 1918. During these years more than \$15,000,000 worth of this metal was produced annually. However, in all years later than 1877 silver production was greater than \$1,000,000, five to ten million ounces being recovered annually. The total production from the Butte district is almost one-half billion ounces.

More than a million ounces of silver are gotten annually from mines in Montana other than at Butte. Important mines are in Cascade, Granite, and Jefferson counties, but much silver is found in Madison and Beaverhead counties. In 1929 a very rich deposit of silver ore, some of which yielded 100 ounces per ton, was found in southwestern Flathead county.

Montana has produced nearly 650,000,000 ounces of silver worth nearly one-half billion dollars, and in 1918 alone the silver production was valued at \$16,797,479.

Lead

Lead mining became important as early as 1880. It, as in the case with most others of Montana's metals, generally occurs in a mixed ore. The principal production comes from Butte, but in 1928 nearly 3,000,000 pounds were mined in Cascade county, and about 1,500,000 pounds in Broadwater county. Lewis and Clark, Madison, Jefferson, and Granite counties each produced between 680,000 and 990,000 pounds of lead in that year. Between 1918 and 1928 the annual state production ranged between 20 and 36 million pounds with a value between one and three million dollars.

Manganese

Commercial manganese was first produced in Montana in 1916, and demand during the World War brought to light the importance of Montana's deposits. At present this state produces several times more commercial manganese than all other states combined.

According to the United States Geological Survey, Montana contains the nation's "greatest, best developed and most available domestic reserves of high grade manganese ore." Estimates made in 1918 showed that near Philipsburg

in Granite county were about 500,000 tons of ore reserves, and about as much at Butte. The Philipsburg product due to its purity is much in demand for use in battery construction, and this district nearly has a monopoly on the market for battery ore.

At the present time, in part because of available low priced ore from foreign lands, less manganese is being mined; nevertheless this state is the chief source of the nation's supply. The value of annual shipments during the last decade (except depression years) ranges between \$600,000 and \$900,000.

Gold

Montana is famed for its tremendously rich gold placers. It was the rich placers of Bannack, Virginia City and Last Chance Gulch discovered from 1862 to 1864 that brought to the state the first big influx of white settlers. Nevertheless, the total value of gold produced is surpassed by the total value of either copper or silver produced.

From 1864 to 1869 the amount of gold recovered from placers was greater than 500,000 ounces annually, the maximum annual recovery being estimated at 900,000 ounces in 1866. From 1870 to 1918 the average annual recovery of gold was about 200,000 ounces, but after 1919 gold production declined to between 53,000 and 90,000 ounces annually. This was mainly because of the increase in value of other commodities relative to the value of gold.

Besides placer deposits many rich lode deposits of gold have been worked, and during the past 20 years gold mining has been confined essentially to veins. About one-half of Montana's gold production comes from mines at Butte where this metal is with ores of other metals. In 1928 the value of this metal produced in Montana was \$1,296,000.

Arsenic

Arsenic occurs at Butte, Jardine, and elsewhere. It, in combination with other metals, forms complex minerals found in veins. Practically all of the state's output of this product is recovered during the treatment of other metallic ores.

Montana, which in 1930 produced about \$800,000 worth of arsenic, is first among the United States in production of this material.

Chromium and Iron

Large potential reserves of chromium occur in Sweetgrass, Stillwater, and Carbon counties. The chromite bearing dikes can be traced several miles along the surface, and are exposed vertically over a range of 2,000 feet or more. At present the metallurgical process for treatment of the chromium ores has not been perfected so that the metal can be marketed at a profit under existing economic conditions. However, there seems little doubt but that the commercial development of Montana's chromite is only a matter of time. The advent of stainless steel and chromium plating promises a bright future for these deposits.

Large bodies of iron ore are known to occur in several places. In Judith Basin and Cascade counties, according to the United States Geological Survey, are one million gross tons. In Meagher county vast reserves of iron are reported. Extensive deposits of magnetite sands occur in Glacier county. Metallurgically the ore is satisfactory for steel manufacture.

Nonmetals

Production of nonmetallic natural resources in Montana ranges between 15 and 20 million dollars annually.

Nonmetallic natural resources produced commercially in Montana are coal, petroleum, natural gas, clay products, cement, phosphate, sand and gravel, gypsum, mica, building stone, crushed rock, calcite, gems, and mineral water. In addition to these several other materials such as graphite, feldspar, asbestos, sheet mica, bentonite, corundum, and abrasive garnet occur. Some of these deposits are known to be of commercial size and the material of commercial quality.

Nonmetallic industries, although not so important or spectacular as metallic industries, are nevertheless extremely important and constitute one of Montana's greatest assets. The recovery of nonmetallic products supplies employment for many hundreds of men and brings returns of 15 to 20 million dollars annually. Total production of nonmetallics is shown in the table on page 52.

Coal

Montana has more extensive coal deposits than any other state west of the Mississippi river. The total reserve is estimated at 409 billion tons, or 11.5 per cent of the total of the United States and 8 per cent of the total reserves of the world. About 380 billion tons or one-third of the United States supply of lignite (or sub-bituminous coal) is in Montana.

Nearly all of the 56 counties in the state have coal deposits. In about three-fourths of the counties coal beds have been worked. The largest deposits are in the plains region which constitutes the eastern portion of the state, and it is here that a bed 30 feet thick without "partings" is mined in open pit by electric shovels.

Several grades of coal ranging from semi-anthracite to lignite* are found, the higher grade coals being confined to the more mountainous areas and the lower grade coals to the eastern area. Although lignite is much more plentiful, deposits of bituminous and sub-bituminous coal are estimated to amount to nearly 30 billion tons. An unimportant deposit of anthracite was found north of Yellowstone park.

Elsewhere lignite has been manufactured into a satisfactory domestic product by briquetting, that is, by pressing into small pellets after special treatment. Some far-seeing observers have suggested that the Montana lignites constitute a seemingly limitless reserve for manufactured gas which in time may be produced at the mines and piped to the consumer. However, it is not likely that this will develop until after the exhaustion of the enormous natural gas resources.

Some of Montana's coal (Trail Creek and Great Falls) can be made into coke,

All Montana coal is of Cretaceous and Tertiary age which geologically is much younger than coal in eastern and central United States. The coal bearing strata constitute a mass over 3,000 feet of land-laid, alternating sandstone and shale; and some of the coal bearing formations are separated by bodies of marine shale hundreds of feet thick. Due to deformation of strata by mountain uplift, the various beds are at different depths in different localities; and over vast areas coal beds have been removed by erosion after uplifts.

*Coal is divided into several classes of which lignite, bituminous and anthracite are the main divisions. Anthracite or hard coal is high in fixed carbon, low in volatile matter, and high in heat value. Lignite is high in moisture and volatile matter, relatively much lower in fixed carbon and heat value, and crumbles on exposure to air. Bituminous coal is intermediate in character and composition.

The principal coal producing areas are shown on the accompanying map.



Coal Fields of Montana

Foremost among coal producing areas are the Colstrip field in Rosebud county, the Roundup (Bull Mountain) field in Musselshell county, the Red Lodge field in Carbon county and the Sand Coulee field in Cascade county. A complete list of Montana coal fields would contain 50 or more names.

Colstrip. Perhaps the most spectacular coal operation in North America if not the entire world, is at Colstrip, south of Forsyth, in Rosebud county, where machinery unique in the history of strip mining is employed. The largest drag-line stripper ever built removes 50 to 75 feet of overburden from the 30-foot coal seam. The largest mechanical shovel ever constructed for the purpose transfers seven to eight tons of coal (enough for a season's supply for a family) at each pass of the shovel in less than one minute directly from the seam to a standard railroad car.

Of much interest is the use of electrical equipment for the large shovels, chosen because of a scarcity of water and the danger of fire from steam shovels. The electricity is generated by water power 180 miles away. The modern machinery permits an average of 50 tons per man per day, whereas in ordinary coal mining methods 5 to 10 tons is an average.

Ninety million tons of mineable coal overlain by only 100 feet or less of overburden lie within an area of about 15 square miles. The coal seam, known as the "Rosebud," is believed to underlie an area of 700 square miles in Montana and northern Wyoming. It is in the Fort Union formation of Tertiary age. The coal is classed as lignite.

Red Lodge and Roundup. Coal at Red Lodge and Roundup is brought to the surface from numerous shaft and tunnel mines. Four workable seams are found in the Roundup field and eleven in the Red Lodge field. The coal is in the Fort Union formation of Tertiary age. Two billion tons is estimated to be available. The coal is bituminous and sub-bituminous, of a good grade satisfactory for domestic use, and has a heat value of 10,000 to 11,500 B. t. u.

In the Bridger field, 20 miles east of Red Lodge, coal was mined from the Eagle formation of Cretaceous age. In the Trail Creek field near Bozeman, coal from the same horizon was of coking quality.

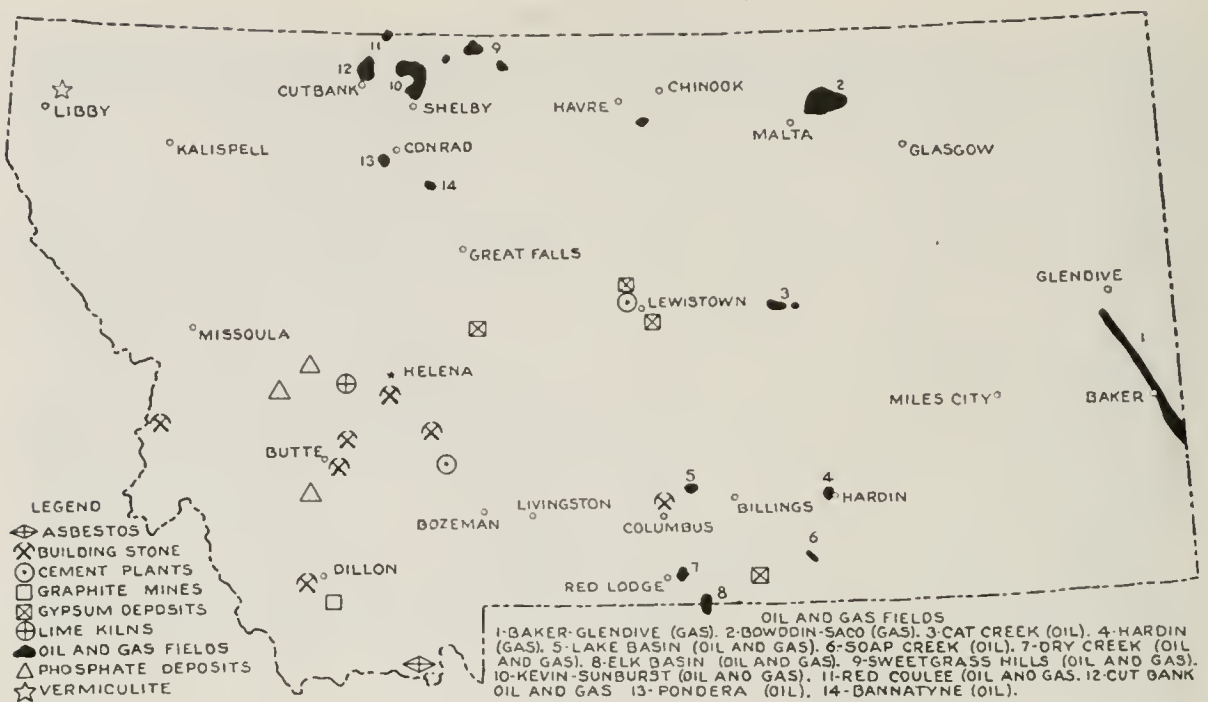
Sand Coulee. South and southeast of Great Falls, near Sand Coulee, Stockett, Belt, and other places, many entries have been driven into a bituminous coal seam which is found at intervals for 50 miles along the north side of the Belt mountains. It appears again near Lewistown 100 miles eastward. The field is of particular interest because much of the coal has coking qualities and the field is near the iron deposits in Judith Basin county. (Coke is used in smelting iron ore.) Geologically the seam is the oldest in Montana as it is in the Kootenai (Dakota) formation of Lower Cretaceous age.

Petroleum and Natural Gas

Montana has 15 petroleum and natural gas fields well distributed in the plains area, east of the mountains, as shown on the accompanying map. Enough oil is available to supply the needs of the state, and at present a surplus of natural gas has been developed.

Oil was first produced in Montana in the Elk Basin field, south of Red Lodge, in 1915, but production did not become important until 1920 when the Cat Creek field, east of Winnett, was discovered. One year later a million and a half dollars worth of oil was marketed. The Kevin-Sunburst, largest of Montana's oil fields, was discovered in 1923. A peak annual yield of 7,727,000 barrels valued at \$10,170,000 was reached for Montana in 1926.

Natural gas was first discovered south of Glendive in 1913, and was soon piped to that city. Subsequent development extended the field 75 miles through Baker and into South Dakota. The field is now the largest of all Montana gas fields with an open flow capacity of 600 million cubic feet per day. Several more fields were found in the next 15 years after the first discovery, but the industry did not reach the million dollar mark until 1928 when a pipe line was constructed from the Kevin-Sunburst-Shelby field into Great Falls. An outstanding achievement in gas delivery was accomplished in 1931 when a 20 and 16 inch pipe line 220 miles long was laid in six months time between the newly found Cut Bank field and Butte at a cost of approximately \$10,000,000.



The most important oil fields are the Kevin-Sunburst, Cat Creek, Pondera, Dry Creek, and Cut Bank. The most important gas fields are Baker-Glendive, Cut Bank, Kevin-Sunburst, Dry Creek, Bowdoin-Saco, and Sweetgrass Hills. In some fields a single well may produce oil from one sand and gas from another sand at a different depth.

Kevin-Sunburst-Shelby Oil and Gas Field. More than 1,000 oil wells and over 180 gas wells have been completed in an area of about 160 square miles in Toole county. Gas was found at depths averaging about 1050 feet, and oil was found in a lower horizon at depths averaging about 1200 feet. The oil is of excellent quality (32° A. P. I.) and generally brings a premium price. The gas is essentially pure methane. Over 200 million cubic feet per day open flow capacity has been developed.

The oil horizon is a porous limestone at and near the top of the Madison formation of Mississippian age. This is geologically the oldest producing horizon west of the Great Plains. The gas horizon is a sandstone in the Kootenai (Dakota) formation of Lower Cretaceous age. The geologic structure is a large dome 25 miles across. The field is described in detail in Memoir No. 1 of the Montana Bureau of Mines and Geology.

Conditions in the Pondera field 30 miles southwest of Shelby are similar to those in the Kevin field.

Cat Creek Oil Field. No gas is produced at Cat Creek, but 121 wells obtained oil from an upper sand and 44 wells obtained oil from a lower sand at depths approximately 1200 feet. The oil (50° A. P. I.) is piped to Winnett, loaded in tank cars, and shipped to refineries mostly in Montana. Some oil has gone as far east as Indiana. The geologic structure is faulted anticline, and the producing horizon is of Lower Cretaceous age. Many of the wells initially produced over 3,000 barrels per day.

Dry Creek Oil and Gas Field. The Dry Creek field is of interest because the oil occurs at depths greater than 5,000 feet, and because the oil is of exceptional quality (60° A. P. I.) Such oil can be used in internal combustion engines without refining although this is not commonly practiced. The first well was drilled in 1931, and initial production of wells was about 2,000 barrels a day. The producing horizon is of Lower Cretaceous age. Several million cubic feet per day per well of natural gas under a pressure of about 1400 pounds per square inch flows from a sandstone a short distance above the oil sand.

Baker-Glendive Gas Field. The Baker-Glendive gas field is largest in extent and in producing capacity. At least two horizons are found at depths of about 800 and 1200 feet. The wells are localized along the crest of a narrow but continuous anticline over 75 miles in length. Daily open flow of 180 wells is in excess of 600 million cubic feet. Pipe lines carry the gas to many towns in Montana, North Dakota, and South Dakota, and an 800 mile pipe line to Minneapolis, St. Paul, and possibly Duluth is contemplated.

Cut Bank Oil and Gas Field. Newest of Montana's oil and gas fields is that at Cut Bank. In 1931 twenty wells driven to a depth of about 2,800 feet were capable of producing daily 5 to 35 million cubic feet each of nearly pure methane gas under a pressure of 720 pounds. The total daily open flow capacity was greater than 250 million cubic feet. Thirty square miles are proven productive, and the field is not yet limited by dry holes. One year after this development a number of wells located southwest of the gas area found high grade oil in the same geologic horizon that yielded gas, but at about 200 feet greater depth. In 1923 an area of 10 miles long and two miles wide was considered proven, and it had not been limited by dry holes. The producing horizon is a sandstone lower Cretaceous in age.

Refineries. Montana petroleum is refined in several plants chief of which are those at Sunburst, Great Falls, Lewistown, Laurel, and Butte. More than twenty refineries have been in operation at one time or another, practically all being controlled by independent operators.

Most of Montana's crude is fairly high gravity oil and is readily refined into gasoline, kerosene, and fuel oil. Refining of lubricating oil is not practiced, the refineries being essentially skimming or topping plants.



ONE OF THE NUMEROUS MONTANA OIL REFINERIES

Cement and Lime

Two large cement plants have been erected by the Three Forks Portland Cement Company in Montana, one at Trident in Gallatin county, in 1910, and one at Hanover, in Fergus county, in 1918. The former has a capacity of 2,250 barrels per day and the latter 1,000 barrels. The product, a standard Portland cement, is shipped to towns and cities within a radius of 500 miles in Montana, Idaho, Wyoming, North and South Dakota, and Canada. Decrease in demand caused the Hanover plant to close in 1931.

The cement plant at Hanover uses relatively pure limestone and shale, both from Carboniferous formations, which crop out in the South Moccasin mountains. The two materials are mixed in the proper proportions, which is about $\frac{3}{4}$ limestone and $\frac{1}{4}$ shale, and then treated. The Trident plant uses a shaly limestone of Devonian age which in its natural condition has about the right proportion of the different constituents necessary for the manufacture of cement. Gypsum, which is added to the mix, is mined in Montana. Coal from the Red Lodge and Roundup districts is used for fuel.

In 1929, 568,000 barrels of cement was produced and in 1930, 438,000 barrels.

Lime has been manufactured at Elliston, Red Lodge, Dillon, Divide, Lime-spur, Butte, Lewistown, and elsewhere. At present only the kiln at Elliston is in condition for operation.

Phosphate

Although the presence of natural rock phosphate in Montana has long been known, not until recently have the deposits been worked on a commercial basis. The phosphate formation, known as Phosphoria, is of marine origin, and consists of several hundred feet of shale, quartzite, and limestone with the phosphate occurring as sedimentary beds at two or more intervals within the mass. Nearly all counties in the southwest portion of the state contain deposits of this rock. The United States Geological Survey in 1925 estimated that 391,323,000 tons of phosphate rock were available in Montana.

At present phosphate is mined about eight miles north of Garrison, trucked to the railroad, and shipped to Trail, British Columbia, where it is manufactured into tri-calcium phosphate to be used as fertilizer.

The phosphate deposits continue southward into Idaho and the Anaconda Copper Mining Company mines the material at Conda, Idaho, and converts it into fertilizer at its Anaconda plant.

The output of Montana phosphate in 1931 was 67,362 long tons, valued at about one-quarter million dollars.

Sand and Gravel

Montana is well supplied with extensive deposits of sand and gravel in all parts of the state. Deposits of this material, 20 to 100 feet thick, extend almost continuously along the valleys of most large streams, and unlimited amounts may be had near railroads and highways. Sand and gravel occurs (1) as recent river deposits, (2) as ancient river deposits on terraces or benches 100 to 600 feet above present drainage, and (3) as glacial drift.

The state highway program, initiated in 1930, has brought into use much sand and gravel for road surfacing. After the road bed is built to proper height a layer of sand and gravel having been crushed to about one-eighth inch size, is mixed with road oil and rolled into place. Ninety per cent of highway surfacing is of this character.

In 1929, sand and gravel production was valued at nearly two and one-half million dollars.

Clays

Clay deposits constitute an unsurveyed resource. Numerous deposits of good brick and pottery clay and shale are known, and several plants have been erected to supply local demand. The most important of these are at Butte, Great Falls and Lewistown. The clays and shales are practically all of the "transported" type, and range in geologic age from pre-Cambrian to recent.

The value of clay products in Montana in 1928 is given as \$470,619. The total value up to 1930 is greater than \$12,000,000.

Gypsum

Two plants for preparation of gypsum products have been constructed in Fergus county, one at Heath and one at Hanover. Stucco, plaster, kalsomine, wall board, and brick have been manufactured.

Gypsum deposits of commercial size and purity are known in Jefferson, Meagher, Cascade, Fergus, and Carbon counties. The deposits in central Montana, which, so far, are the only ones worked, are sedimentary beds 5 to 30 feet thick in the Ellis (Jurassic) and Quadrant (Pennsylvanian) formations. The deposits in southern Montana, in places 40 feet thick, also are sedimentary beds and are in the Chugwater formation of Triassic age.

Building Stone

The state is well supplied with good building stone of several varieties, chief of which are granite, sandstone, marble, travertine and volcanic rock (rhyolite and andesite.)

Granite occurs in most of the mountain sections, but has been quarried principally in Silver Bow, Jefferson, Lewis and Clark, and Ravalli counties. Although of a gray color it is of different shades. In 1928 the value of stone of this type was \$45,291.

Sandstone has been quarried in many localities chiefly for local use. From some quarries, as at Columbus and Dillon, stone of this type has been shipped to distant markets.

A fine textured, durable, dolomitic limestone, black in color, but possessing irregular golden brown markings, has been successfully quarried near Townsend, in Broadwater county; and is marketed as "Montana Black and Gold Marble." Deposits of the same stone, are known elsewhere. White marble also occurs, but such deposits have not been developed.

Travertine, a calcareous hot springs deposit, occurs in great quantities near Gardiner and at other places. In 1932 this stone was placed on the market and promises to be a favorite. The finished stone is similar to that which was used in the construction of the Pennsylvania depot in New York City.

A beautifully banded siliceous rock especially suited for interior decoration and novelty ornaments is found near Alder, in Madison county.

Vermiculite

Vermiculite, a peculiar decomposition product of mica sold under the trade name of zonolite, has been successfully mined and marketed near Libby, in Lincoln county, from what is probably the largest and best-known deposit in the United States. This new commodity to industry is a complex silicate mineral similar to black mica, but which upon being heated expands and exfoliates in very thin paper-like flakes, and assumes a golden or silvery luster. It is used for heat, sound, and electrical insulation, as a decorative for wall paper, and in the manufacture of wall-board. The material occurs in igneous dikes. Other deposits occur in Hill and Granite counties. In 1930 the value of the product was \$25,000.

Calcite

Calcite (crystalline lime carbonate) has been mined for a number of years from several well developed veins near Springdale, in Park county. The product although milky white is unusually pure. It is used principally for chicken and stock feed, and is shipped to many points in Montana, Wyoming, the Dakotas, and Minnesota. Iceland spar, the transparent optical variety of calcite, is found in the same region.

Graphite

An extensive deposit of graphite, comparable in purity and quality to material from eastern deposits and from Ceylon, occurs about nine miles south-east of Dillon in Beaverhead county. Although not being worked at present, the deposits have been developed to some extent. These deposits are a potential reserve which may be utilized at almost any time.

The graphite occurs in veins and veinlets in granite and is disseminated in limestone.

Asbestos

Another of Montana's undeveloped resources is a deposit of chrysotile asbestos west of Yellowstone park in Madison county. Veins of material, somewhat similar to that mined in Quebec, are found cutting serpentine of pre-Cambrian age.

The amphibole variety of asbestos has been mined in Lincoln county near the deposits of vermiculite.

Bentonite

Sedimentary beds and irregular bodies of bentonite, a clay-like material similar to fuller's earth, occur in many localities, both in the mountains and in the plains of Montana. The principal use of bentonite is in the refining and clarifying of oils. A market for the Montana product has not yet been developed, largely because its qualities are little known. Nevertheless hundreds of thousands of tons of it which can be mined by steam shovel methods are available.

Gems

The Yogo Gulch sapphires mined in Judith Basin county, have become world famous for their beauty in brilliancy and depth of color. The gems, which occur in an igneous dike cutting limestone, are mined, separated from the rock, and shipped for cutting whenever a demand in the market arises. In several years the annual production was nearly one-quarter million dollars.

A semi-precious gem known as moss agate is collected from Yellowstone river gravels between Livingston and Glendive. The unusual qualities of the stone are due to dendritic growths of manganese and iron oxide within a translucent agate. Several lapidary establishments at Billings and elsewhere find full time employment cutting and polishing the agates.

Sapphires are found in Granite, Powell, and Silver Bow counties. Rubies also have been reported.

Mineral Water

Montana has more than a dozen artesian basins, where flowing water may be obtained from wells. From several wells water flowed at a rate of more than 75,000 barrels per day. Some water is reported to possess medical properties, and has been marketed as mineral water.

Hundreds of hot springs are found in the mountain areas. They constitute a natural resource of inestimable value for health and recreation. Hotels, bath houses, and cabins for summer occupation have been constructed at many hot springs.

Miscellaneous Mineral Resources

Besides the metallic and nonmetallic products mentioned are many others, which may at some time in the future prove to be of great economic importance. Feldspar in coarsely crystalline masses occurs in several localities near Butte, Sheridan, Bozeman, and elsewhere. White sheet mica (isinglass) has been found in the Tobacco Root and Gallatin mountains. A large deposit of corundum is on upper Elk Creek in Gallatin county. Garnet suitable for abrasive material is found in the Tobacco Root and Ruby mountains and elsewhere. Volcanic ash and diatomite have been reported to occur in commercial amounts. Stone suitable for grindstones is to be had. Veins carrying barite are in Missoula county, and barite occurring as a gangue in certain metal bearing veins may be saved as a by-product. Deposits of sand apparently suitable for glass manufacture are found along Missouri river, and foundry sand may also occur. Molybdenum in noticeable amounts accompanies some mineral deposits. Antimony and bismuth, other than that which is recovered in the treating of ores, occurs in some localities as veins and disseminations.

METALLURGICAL INDUSTRY

Montana Has Immense Reduction Works Within Which all Values Are Extracted From its Varied Ores by Most Modern Methods Known to Science

By CURTIS L. WILSON, Professor of Metallurgy
Montana School of Mines

METALS are the basic commodities of all industries, and the industrial development of an empire is determined largely by its metallic resources. Montana has long been known as the "Treasure State" because of its vast resources of those treasures of industry, the metals. It is a leading producer of copper, gold, silver, lead, and zinc, and contributes considerable amounts of platinum, palladium, arsenic, manganese, selenium, and tellurium.

The Production of Copper

The principal copper minerals of Butte are chalcocite, usually called "copper glance"; bornite, often referred to as "peacock copper" on account of its bright colors; and enargite. Chalcocite is a sulphide of copper, bornite a sulphide of copper and iron, and enargite a copper arsenic sulphide. These minerals are associated with other copper minerals, such as chalcophyrite and covellite, as well as with the iron sulphide, pyrite.

In the ores the copper minerals are accompanied by a large proportion of gangue material consisting chiefly of quartz and granite, and contain on the average only about 4 per cent copper with small amounts of gold and silver. The problem of the metallurgist is to win the copper, silver, gold, and valuable by-products from this mass of ore with reasonable speed and at a cost which will permit a profit. This problem of "bringing the copper forward" is accomplished first by eliminating the gangue material by milling and securing the valuable minerals in a concentrated form, containing about 25 per cent copper. This concentrate, in a finely divided state, is heated in hearth furnaces where some of the sulphur is eliminated, leaving a roasted material which now contains 30 per cent copper.

The product of the first smelting operation is a mixture of copper, iron, and sulphur, and is known as copper matte. The matte contains 45 per cent copper, and is next treated in huge furnaces called converters, where the sulphur is volatilized by blowing air through the molten matte, and the iron is oxidized and slagged by suitable fluxes. The product of the converters is termed blister copper, because if it is cast into slabs, the dissolved gases escape during solidification and produce a number of excrescences, or blisters on the solid surface. Blister copper is 98½ per cent pure; it is refined by fire to about 99 per cent and then is cast into the shape of 640-lb. anodes. These anodes are placed in electrolytic tanks with a copper-sulphate solution and electrolyzed. Electrolytic copper is plated out at the cathode, and is purer than the purest gold. It is usually remelted and cast into cakes for rolling into sheet, or into wire-bars for drawing into wire.

Smelting and Refining Operations

The smelting and refining operations of the Anaconda Copper Mining Company are carried out at Anaconda and Great Falls. The plant at Anaconda is the largest non-ferrous smelter in the world, and its graceful smoke stack, 585 feet high and 60 feet inside diameter at the top, is likewise the world's largest. Besides being a large producer, the plant with its highly-trained technical staff is a pioneer in research work, and many new processes have been devised here, not only in the metallurgy of copper, but also in the production of zinc, sulphuric acid, bricks, and phosphate fertilizers.

The ore is transported from Butte to Anaconda, a distance of about 26 miles, over the Butte, Anaconda, and Pacific railroad, the first electrified railroad in the country. As much as 16,000 tons per day is transported in 50-ton steel cars. As the ore is in large lumps, it must first be crushed to free the interlocked minerals. A large gyratory crusher is used for this purpose. Each car is picked up by a rotary car dumper and its contents are dumped into the crusher. Cone crushers follow the gyratory, and these in turn are followed by rolls, and finally ball mills grind the ore to a pulp in which practically all of the mineral particles are free. The fine pulp is fed into flotation machines, where oil and chemical reagents cause the valuable minerals to cling to small air bubbles and float, while the waste gangue material sinks to the bottom and is discarded as tailing.

The flotation concentrate is dewatered in settling tanks and filter presses, and then goes to large seven-hearth furnaces where it is roasted. Once ignited, the sulphide particles burn readily in air, and very little extraneous fuel is required. The sulphur fumes may be used to manufacture sulphuric acid or may be diluted with air until harmless and then ejected from the stack. Arsenic is collected from the roaster gases by means of Cottrell precipitators, in which electric currents of 75,000 volts remove all fume from the smoke.

Roasted by Natural Gas Heat

The hot, roasted calcine is charged into reverberatory furnaces, eight in number, and smelted. These furnaces are 143 feet long and are heated with Montana's excellent natural gas. On the bottom of the furnaces is a lake of molten matte and slag, and the calcine soon fuses into this lake, the gangue going into the slag and the copper, silver, gold, and some iron into the matte. As matte is heavier than slag, it sinks to the bottom and is drawn off at a spout placed at a lower level than the slag tap. The slag is worthless and is stored on a large dump covering several acres. To facilitate storage, the

molten slag stream leaving the furnace pours into a launder of water, and the action of the cold water on the hot slag results in a granulated material which is easily washed away to the dump.

The matte, containing the copper, gold, and silver, and still so hot that it is liquid, is taken in large ladle cars and poured into converters lined with magnesite brick. Compressed air is forced through the matte, and sulphur fumes are belched forth, to be diluted in 120-ft. flues and carried up the stack. These gases are rendered harmless, so that no damage is done to the many ranches and farms surrounding the smelter, and no odor is noticeable in the city of Anaconda, where residents take pride in their lawns, trees, and flowers. After the oxygen of the air has removed the sulphur and slagged the iron, the molten copper remaining is poured into a refining furnace. Here the copper is made suitable for casting into anodes by stirring with 25-ft. green pine poles. The plant at Anaconda produces as much as a million pounds of anode copper every day.

The electrolytic refining of anode copper is done at the Great Falls refinery, 196 miles northeast of Anaconda. Great Falls is situated on the Missouri river and has a tremendous supply of electrical power from the many waterfalls of the Missouri.

The Refining of Copper

The anodes from Anaconda are cast into shapes three feet long, two-feet wide, and two inches thick, weighing over 600 pounds. They are provided with ears or lugs which support the anode as it rests in the electrolytic tank, immersed in a solution of copper sulphate and weak sulphuric acid. There are 1,530 tanks in the tank house, each tank holding 25 anodes and 26 cathodes. The impure copper dissolves at the anode and is deposited as pure electrolytic copper at the cathode. It takes about 24 days for a 600-lb. anode to dissolve; the cathodes of pure copper, weighing 140 pounds, are removed every six days. Some impurities in the anode copper are dissolved in the electrolytic, but they do not deposit at the cathode, so the electrolyte solution must be purified from time to time. The gold, silver, and platinum in the anodes do not dissolve, but as the copper is dissolved away from them, they fall to the bottom as mud and slime. This anode mud is cleaned out of the tanks periodically, and although it looks black and dirty, it is a precious cargo. It is packed in strong boxes and shipped to Perth Amboy, New Jersey, where it is purified into gold and silver bars.

The electrolytic cathode copper is remarkably pure, but it is brittle and does not possess sufficient mechanical strength to permit rolling into sheet or drawing into wire. So it is melted in large furnaces and cast into wire-bars.

For many years an evergrowing amount of refined copper was shipped to the Atlantic seaboard to be fabricated into sheets, rod, tubing, and particularly copper wire, only to begin a return journey across the continent for use in the western states. The rod and wire mill at Great Falls has changed all this by affording the far west a convenient supply base for copper rods and wire.

The Great Falls plant takes the 200-pound wire bars from the electrolytic refinery and places them in a gas-fired annealing furnace. The bars travel through the furnace and after one hour's heating, emerge at the rate of 100 per hour. The white-hot bars are rolled in a series of grooved rolls, during which they are squeezed to rods many times their original length. The rod is hot and pliable, and is wound into coils. These coils are cleaned in sulphuric acid and are drawn through steel dies. Wire-drawing makes copper hard and strong, and for such purposes as trolley wire is most satisfactory. If a softer wire is desired, it is annealed in a furnace and wound on stranding machines into huge cables containing hundreds of separate wires.

Electrolytic Zinc

The Anaconda Copper Mining Company operates two electrolytic zinc plants in Montana, one at Great Falls, having a capacity of 20,000,000 pounds of zinc per month, and one at Anaconda with a capacity of 10,000,000 pounds of zinc per month.

The electrolytic process was developed by Anaconda metallurgists in 1916 and has become the standard method all over the world for complex ores which would otherwise be worthless. The ores are concentrated by selective flotation.

resulting in a zinc concentrate, which is sent to the zinc plant, a lead concentrate, which is shipped to a custom lead smelter, and a tailing, which is thrown away.

The zinc concentrate is roasted in furnaces similar to those used for roasting copper ores; the zinc is converted into the oxide form, and the sulphur is eliminated as gas. The roasted concentrate, or "zinc calcine," as it is called, is treated with dilute sulphuric acid, which leaches out the zinc, as well as some of the impurities. The leaching tanks are of the Pachuca type, made famous in Pachuca, Mexico, where they were originally used for cyaniding gold ores. As the sulphuric acid dissolves not only the zinc but also a considerable quantity of iron, silica, alumina, arsenic, and antimony which occur in the complex ores, the scientists were compelled to devise a method of ridding the solution of these detrimental substances. After the acid has dissolved as much of the roasted ore as was soluble, fresh calcine is added, and this neutralizes the acid. Air is blown through the mixture, and the impurities precipitate out. The contents of the large Pachuca are delivered to Dorr settling tanks, where all solid materials sink to the bottom, while the clear solution overflows at the top. The underflow is washed and filtered in various types of filters, such as the Moore, the Oliver, and the American. The residue is shipped to East Helena for the recovery of lead and silver.

As the zinc produced by the electrolytic method must be 99.99 per cent pure, the clear zinc sulphate solution is further purified to a still higher degree by the addition of zinc dust. This zinc dust, made by atomizing molten zinc in a blast of compressed air, precipitates any copper and cadmium which may be present. The "cadmium cake," after filtering is treated in the electrolytic cadmium plant.

The purified zinc solution is fed into lead lined cells containing aluminum cathodes and lead anodes. The plant at Anaconda operates 576 cells; the one at Great Falls 1,152 cells. The electric current passing through the solution deposits the zinc on the aluminum cathodes, from which it is stripped every 24 hours. The electrolyte is neutral at first: that is, it contains no free acid. As electrolysis proceeds, however, for every 65 pounds of zinc deposited, 98 pounds of acid are regenerated. This acid in the spent electrolyte is used for leaching more zinc calcine, so the acid simply goes through a continuous cycle of solution and regeneration.

Zinc cathodes are chemically pure, but as they are in large sheets they are too clumsy for shipping and are quite brittle. They are therefore melted in gas-fired furnaces, and cast into commercial shapes bearing the "Anaconda Electric" trade mark. Each lot is analyzed, not only chemically but also by means of the spectroscope, to insure the highest degree of purity.

Lead Smelting

Lead ores and lead concentrates of Montana and surrounding states are smelted at the large plant of the American Smelting and Refining Company at East Helena. The plant is modern in every respect, for as soon as new methods and new machinery have proved their worth, they are adopted and the old methods and machinery are discarded.

Concentrated lead ore, which is usually rich in lead and silver, is weighed and sampled as soon as it reaches the smelter. It is then taken to the sampling mill, where automatic Vezin samplers, in compliance with state laws, cut out representative portions for assay. Sampling is done so carefully and accurately that the valuable metals occur in the same proportions in the $\frac{1}{2}$ -gram sample which the chemist analyzes as they do in the carload lot.

After passing through the sampling mill the material is roasted on Dwight-Lloyd sinterers. Roasting removes most of the sulphur, converts the lead into oxide form, and produces from the finely divided flotation concentrate, which would blow away in the blast furnace, a sintered product which is hard and fairly dense. This sinter is charged to four water-jacketed blast furnaces, along with coke and limerock. The coke acts as fuel and produces high temperatures. It likewise furnishes the reducing agent carbon, which combines with the oxygen of the roasted sinter and leaves the lead free. The limerock fluxes the gangue materials in the ore. At the high temperature of the blast furnace, both slag and lead are liquid; they flow to the crucible at the bottom of the furnace, and here

the lighter slag floats on the heavier lead. They are tapped at different levels. The lead is "softened" in huge kettles to remove some of the impurities, and is then cast into "pigs," to be shipped to Omaha where the silver is removed.

In order to purify the smoke coming through the flues from the roasting and blast furnaces, the smelter has constructed both Cottrell electrical precipitators and bag house. In the bag house the smoke passes through 3,000 woolen bags, each 30 feet in length and 18 inches in diameter. The lead fume is thus filtered out and recovered.

The slag from the blast furnace contains around 14 per cent zinc, due to the fact that the smelter treats the zinc residue from the plant at Great Falls. This zinc residue is the portion of the zinc ores which is insoluble in sulphuric acid, and consists largely of lead and zinc. An ingenious method of cooperation between the two plants has resulted in the recovery of the lead in the zinc residues and of the zinc in the lead blast furnace slag.

The molten slag is taken from the blast furnaces in ladle cars to a reverberatory furnace, where powdered coal is blown through it. The coal reduces the zinc oxide to metallic zinc: as the temperature is high, the zinc vaporizes and as soon as it reaches the air above the slag layer, it oxidizes again to a pure white fluffy zinc oxide. This is carried by the air current through a series of goose-neck flues until it has cooled down sufficiently to be filtered in bags. The zinc oxide is sent to Great Falls, dissolved in acid, and recovered as metallic zinc in the electrolytic cells.

Cadmium Refining

Cadmium is a metal which is useful as an important component in many alloys and as a protective coating for iron and steel. Because of its highly colored chemical compounds it likewise finds extended use as a paint pigment. Of peculiar interest is the fact that there are no cadmium ores; the metal is found associated with zinc, and usually in the ratio of about 1 to 200. It is therefore produced at Great Falls as a by-product in the electrolytic zinc process. The cadmium cake resulting from the purification of the zinc solution is first rid of its copper content by roasting and leaching. The purified cadmium solution is then electrolyzed, and the cathodes are melted, cast into sticks, and marketed in this form.

Arsenic Recovery

The Butte copper ores are exceptionally rich in arsenic, and in the many furnace operations, such as roasting, reverberatory smelting, converting, and fire refining, the arsenic oxidizes and goes into the metallurgical smoke. The smoke and gases carry some dust, and while the percentage is small, the enormous volumes emitted every day would result in a large loss if allowed to blow away. The dust-bearing gases are consequently passed into brick settling chambers, where the velocity, and thus the carrying capacity, of the gases is reduced, and the dust settles out. These chambers are elevated above ground level, and the bottoms are made up of numerous steel hoppers from which the dust is drawn into cars and delivered to the reverberatory furnaces.

From the settling chambers the hot furnace gases travel through brick flues about a mile and a half in length. The main flue is 60 feet wide and 20 feet deep, and the last half of it is widened to 120 feet. Before entering the stack, all gases must pass through the electrical dust precipitators, commonly known as Cottrell Treaters. Plates of corrugated steel, 24 feet wide and 21 feet high, are suspended vertically in 20 independent treater units. A row of wires spaced at 5-inch intervals is hung between the plates, there being 21 plates and 20 rows of wire in each unit. The wires carry a static charge of electricity at 75,000 volts, and the plates are grounded. As the gases rise through the treater, the dust particles and fume become positively or negatively charged and are attracted to the wires and plates. Here they give up their charge and collect in masses large enough to fall through the ascending gas currents into hoppers below the plates. Every four hours the current is cut off and the adhering dust is dislodged by rapping with wooden poles.

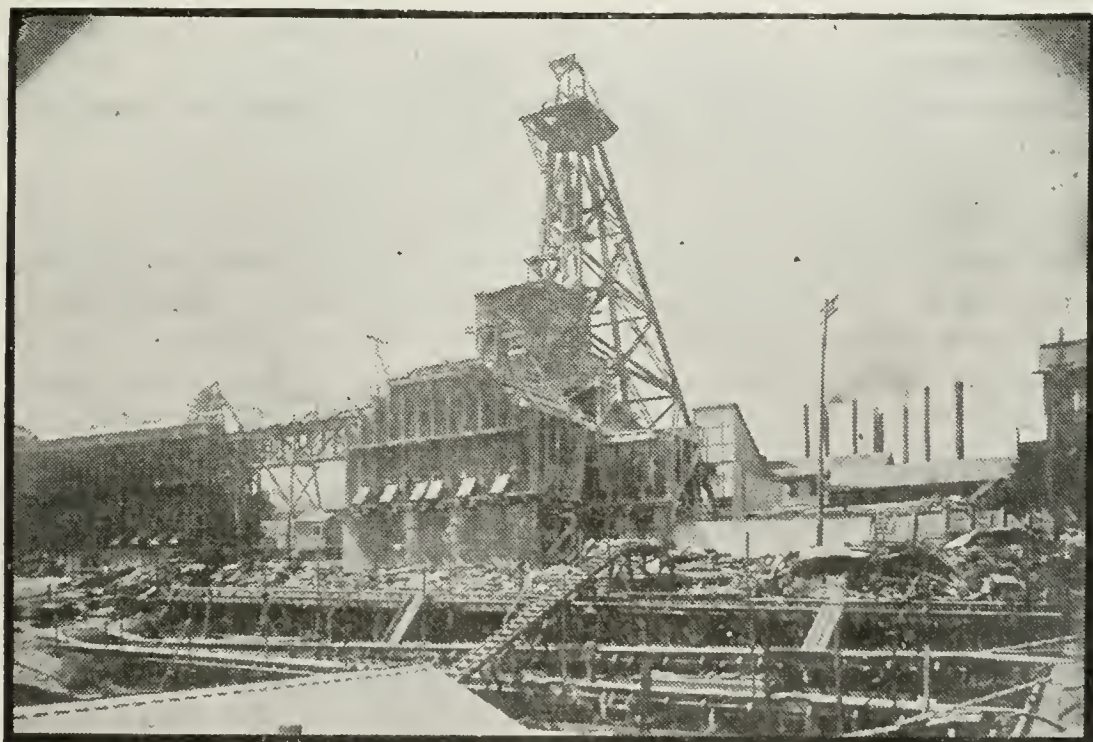
The dust settling in the main flue contains about 27 per cent arsenic trioxide, and that collected in the treaters contains about 45 per cent. This dust is charged into roasting furnaces, where the arsenic sublimes and is passed into large steel shells. Here it condenses and is withdrawn as crude arsenic contain-

ing about 93 per cent arsenic trioxide. The crude arsenic is now fed into reverberatory furnaces from which a pure grade of white arsenic sublimes, known as Anaconda Prime White Arsenic and having a purity of 99.3 to 100 per cent. It is used principally as an insecticide, in the manufacture of glass, and in the chemical and pharmaceutical industries.

Phosphate Fertilizer

The metallurgical industries are utilizing to an ever increasing extent the valuable by-products obtained during the extraction of the metals from their ores, and are thereby affording the people a maximum enjoyment of the mineral wealth of the state. The major portion of the sulphuric acid manufactured from the roaster gases at the copper smelter at Anaconda is devoted to the production of Anaconda Treble Superphosphate. This superb fertilizer is made by treating phosphate rock with sulphuric acid in such a way that the phosphorus is converted into a form in which it is available as food for plant life. Ammonium phosphate is likewise manufactured, and this material supplies not only phosphorus but also nitrogen.

The phosphate rock is first calcined in roasting furnaces, in order to remove organic matter, and is next ground and screened. It is then fed in agitators and mixed with sulphuric acid. The sulphuric acid and the rock react to form liquid phosphoric acid and solid calcium sulphate. This latter is separated out in Dorr thickeners followed by Oliver filters, and is discarded. The phosphoric acid is concentrated in steam-heated Swenson evaporators until it contains 45 per cent phosphorus pentoxide. This concentrated phosphoric acid is mixed with ground phosphate rock and allowed to stand until it sets or solidifies. It is next disintegrated and allowed to stand in storage piles for 30 days, during which time the reaction between the acid and the rock goes to completion. The aged material is removed by crane and conveyors to dryers where its moisture content is reduced to about 3 per cent. The dry product is ground and screened, and is then put into bags for shipping. The finished material contains about 46 per cent available phosphoric acid or almost three times as much as ordinary phosphate. The plant treats about 200 tons of phosphate rock every day, uses 130 tons of sulphuric acid, and produces 120 tons of Treble Superphosphate.



SURFACE WORKS OF ONE OF THE BUTTE COPPER MINES

SEEDS ARE HIGH IN QUALITY

WHILE wheat has been Montana's major agricultural crop since it became recognized as a farming state, it is not in wheat alone that Montana predominates as a producer of high quality grains and seeds.

Altitude, climatic conditions, and careful selection of types best adapted to its soils and light rainfall have served to develop hardy seeds of high germination as the basis of the state's heavy production of wheat, alfalfa seed, barley, oats, rye, peas, beans, flax and clover seeds.

Montana's hardy alfalfa seed is of a very high type and extremely desirable in other alfalfa growing states of the Union, where the bulk of the Montana seeds are marketed.

Under the supervision of the Extension Service, Montana State College, production of registered pure seed has gained considerable impetus in recent years to the extent that while but two fields were registered in 1919, the number in 1931 increased to 760 fields.

Registered seed now totals from one-fourth to one-third of the state's production of alfalfa seed. All registered alfalfa seed is marketed under the tag and seal of the Montana Seed Growers Association and is mostly cleaned in authorized cleaning plants and all sealed by an authorized representative of the association.

According to the United States Department of Agriculture, Montana produced in 1930, 144,000 bushels of alfalfa seed from 66,000 acres, an average yield of 2.6 bushels to the acre, compared with a total United States production of 1,145,400 bushels from 419,900 acres, an average yield of 2.73 bushels to the acre. According to these figures Montana, with 15.7 percent of the United States acreage, produced 15 percent of the total yield.

Approximately 95 percent of Montana's export of alfalfa seed goes to Wisconsin and Minnesota for planting.

Seed Peas

Because of the elevation, soil and climatic conditions which are conducive to the growing of the very highest grade of canning peas Montana's seed peas are greatly in demand in the major pea growing and canning states of the Union.

Large acreages in several of the high, irrigated valleys of the state are annually devoted to the growing of seed peas which are handled through 10 seed warehouses about the state where the peas are cleaned and picked.

In 1930 approximately 16,500 acres produced 300,000 bushels of seed peas, an average yield of 18 bushels to the acre. Of this quantity about 50,000 bushels were reserved for re-seeding, making available about 250,000 bushels for disposal in other pea growing sections of the country. It is estimated that Montana's production of seed peas in 1930 was sufficient to plant over half of the 309,060 acres devoted to peas in the United States in 1931.

Montana seed peas are marketed largely in Wisconsin, New York and Illinois, the major pea canning states.

MONTANA'S AGRICULTURAL ROMANCE

*Begins with Coming of Explorers, Fur Traders and Missionaries
Given Impetus by Gold Seekers—Discouragements
Follow Years of Prosperity*

By JAY G. DIAMOND, Agricultural Statistician
State-Federal Crop Reporting Service

EVERY state as well as every nation has its agricultural romance, but few have had the dramatic setting, the splendid scenery and stage effects that have gone to make the beginnings of agriculture in Montana so colorful and to mark its progress with so many tense moments.

Time: New Year's day, 1743. The first white men urge their weary horses westward in what is now southeastern Montana. Ahead of them, like fantastic barriers across their road, they behold through the translucent, sparkling atmosphere the majestic mountain sky-line of Montana, painted by a setting sun in almost unbelievable colors of pink and green, grey and yellow, indigo and purple. The Chevalier and Pierre de la Verendrye, the first white men to set foot on Montana soil, are also to name the great commonwealth with the words: "This is the Land of Shining Mountains."

Time: 1803. France and England are at death grips for world empire. Napoleon sells what now is Montana, together with other regions included in the Louisiana purchase, to the United States and an expedition is planned by President Jefferson, to bring back knowledge of the mysterious regions of the west.

Time: 1805. Lewis and Clark are crossing Montana. There are 34 men and one woman in the party. The woman is an Indian, Sacagawea by name. Through two thousand miles she is to lead the way, with her babe upon her back. When hope sinks in the hearts of the white men she encourages them.

Time: Fall and winter of 1807-8. Manuel Lisa is establishing the first fur trading post at the junction of the Yellowstone and Big Horn rivers.

Time: Spring of 1842. Father De Smet, a Catholic missionary to the Indians is seeding his first crop of grains and vegetables on irrigated ground near the present site of Stevensville in the Bitter Root valley. Little does he realize that he is laying the corner-stone of a great agricultural commonwealth.

Montana's Agricultural Romance Officially Starts

Time: 1862. Gold has been discovered at Bannack and thither come the gold-seekers. They come in sheer adventure, some perhaps outlawed from childhood homes, but most of them in quest of quick wealth and planning but a short sojourn in Montana. But there is a lure in Montana more potent than gold, that with the passing of the years is to claim them so that they are to remain and die in the land of shining mountains. Many of them are to remain to become Montana's pioneer stockmen and farmers.

Time 1864: The coming of the gold seekers has begun the colonization of Montana, the first influx of importance having gone to Bannack and the second a year later to Alder gulch. The coming of the gold seekers has also started agricultural settlers along the east slope of the Rockies and in the Bitter Root valley. A year later the first report of the territorial auditor is to show 82,706 acres of land claimed in the counties of Madison, Lewis and Clark, (then Edgerton,) Beaverhead and Gallatin.

Time: 1871. On February 10, David D. Carpenter of Helena received patent on the first homestead entry made at the Helena land office August 1, 1868. The first deeded farm contained 150.55 acres of land. Part of this original tract is now embraced in the grounds of the Lewis and Clark county hospital. Amid the mad rush for gold there had been those who saw beyond the boom of the mining days to that time when Montana agriculture would establish homes for them and their children. These practical minded pioneers had set their hands to the building of such an agriculture, to supply food for the mining communities that are now springing to life like mushrooms.

The first U. S. census (1870) counted 851 farms in the territory. They embraced 139,357 acres and were valued together with livestock and equipment at \$2,154,569 a figure destined within the next 50 years to reach nearly a billion dollars. The first report of the territorial auditor in 1856 had shown 1,896 head of cattle and 4,325 head of oxen. Cattle, however, had been introduced into the territory as early as 1832 by the fur-traders who wanted fresh beef and butter.

Time: 1880. Montana mines have already produced a wealth of more than \$200,000,000. Agriculture is still an infant hugging closely to the environs of the mining camps and almost entirely dependent upon the miners as consumers of its products.

As early as 1862 a bunch of cattle owned by Patrick Largey of Butte were trailed to market at Salt Lake City. In 1874, Conrad Kohrs made the first shipment of cattle from Ogden, the beef having been trailed overland from the Sun River country of Montana. After 1876 many shipments were trailed from Montana to Cheyenne, Wyoming, for loading on the Union Pacific. Between 1869 and the late eighties the famous Texas drives brought annually thousands of cattle into the rich feeding grounds of Montana.

Wheat, although the leading crop in production and value in 1870, has now become second to oats, which is finding a ready market in the stage lines and military posts. Considerable wheat is being milled, however, for the needs of the territory, and at the beginning of the decade, the census had shown three flour mills in Gallatin county; three in Missoula, and one in Madison.

Mining has already experienced some ups and downs. Agriculture, the adopted child of the mining camps finds its fortunes rising and waning with the luck of the camps. It has now (1880) diminished considerably in Jefferson and even in Gallatin county with the wane of placer mining activity. On the other hand the census shows gains in Madison, Missoula, Custer, Chouteau, Meagher and Lewis and Clark counties.

Not many people are taking the agricultural possibilities of the territory seriously and while the number of farms has almost doubled it is still less than 1,600, with a total value of \$12,806,243 of which livestock alone accounts for \$9,170,554.

The romance of agriculture continues in a setting that is almost an unchartered wilderness, a land of mining camps and the great outlying public domain, with buffalo, stage coaches and marauding Indians. Indian wars are to free finally the white settlers from the depredations of the hostile reds, with the Custer massacre in 1876 signaling a united front against such menace. Survey crews are working westward from the Dakotas and northward from Utah. A new impetus is coming in the form of railroad transportation which is to transform a wilderness into a modern commonwealth.

The Coming of the Railroads

If the first impetus to agriculture in Montana was the miner in the sixties, then certainly the coming of the railroads in the eighties logically becomes the second great impetus. Already by 1880, a narrow gauge railroad is connecting Red Lake, Montana, with Eagle Rock, Idaho, and the name of the railroad is the Utah & Northern.

Time: September 8, 1883, Gold Creek, Montana. The last spike is being driven uniting the lines from west and east. The Northern Pacific railroad has after 13 years of effort mapped with steel rails the historic trail of Lewis and Clark and Montana agriculture is linked with the great markets of the Atlantic and Pacific.

Time: 1887. The Great Northern railroad is extending its line from Minot, North Dakota, to Helena, Montana, a distance of 645 miles to break all previous records for railroad construction in a single year.

The Great Northern completed construction from Havre to the Pacific coast in 1893. The first Montana construction of the Chicago, Burlington & Quincy railroad occurred in 1894 when 102 miles was constructed from the Wyoming line to Huntley. The Chicago, Milwaukee & St. Paul railroad built into Montana as far as Harlowton in 1908.

The romance of agriculture has moved into the setting of the cattle baron and cowboy. The buffalo is disappearing from the plains and great herds of cattle are transforming the rich wealth of prairie feed into beef for eastern markets. No longer does the Indian build his wigwam in unfettered freedom. Towns are beginning to dot the landscape—towns that are picturesque in their rough, unpainted structure. There are hay-markets and lines of saddled horses along littered and unpaved streets, while from many saloons come the raucous songs of the happy cowboys. Among such boon companions is one destined to fix on canvas the spirit, color and atmosphere of these stirring days—the great cowboy artist, Charles M. Russell.

The Effect of the Railroads

With the railroads come agricultural prosperity. It is a prosperity of the stock-raising industry. Farming other than stock-raising is still a small part of the whole agricultural enterprise. Land values are to nearly double before the end of the decade.

Value per acre including improvements rose from \$7.97 in census of 1880 to \$12.99 per acre in census of 1890.

Eastern and foreign capital is coming into the state to finance and expand the cattle industry and later the sheep industry. It is the day of the large cattle companies when the industry was featured by large company holdings of both land and livestock. Receivers and registrars of the U. S. land office are calling attention in their annual reports to the practice of cattle companies of having their riders and friends file upon bottom land along streams under the desert land act. The company puts water on the land, the entryman proves up,

The desert land act passed in 1877 and in the next four years 370 desert claims were made comprising 122,641 acres of land.

receives his patent and then transfers the tract to the company. During the decade cattle numbers are to increase six-fold and sheep numbers ten-fold. The growth of sheep numbers is to bring trouble between cattlemen and sheepmen over the use of the range.

In 1880 the census gave the sheep population at 185,000 head and the 1890 census enumerated 1,990,000 head. Prior to 1880 there were few sheep in Montana although sheep had been introduced into the territory in 1857 by Thomas Harris.

The railroads have removed the means of Indian depredations to a large extent in eastern Montana. An expansion of agricultural settlements is taking place to carry them out along the Yellowstone as far east as Glendive, through the Big Horn and Powder river regions, into the Milk river valley and into the Flathead country. The number of farms is growing, soon to exceed 5,000, and to occupy close to two million acres of land, but stock-raising is to continue to represent the large bulk of the agricultural investment and mining is to continue to lead all other industries in the annual creation of new wealth.

The romance of agriculture moves on to one of its first tragedies in the late eighties. It is symbolized by the picture of a lone thin cow standing in stoic silhouette against lowering skies and drifting snow. To one side wait the rapacious prairie wolves, with dripping jowls waiting for the first sign of weakening. The name of the picture is "Waiting for a Chinook" and it is the cowboy artist's laconic description of the effect of the terrible winter of 1886-87. Weather is to play an important and at times a tragic role in the agricultural romance of Montana.

The summer of 1886 was hot and dry, ranges were heavily stocked and grazing conditions poor. A short crop was harvested and stockmen went into the winter with low feed reserves, hoping for an open winter. The winter proved to be unusually severe and cattle died by the thousands. The season of the summer of 1886 to the summer of 1887 was recorded as one of the most unfavorable in the history of stockraising in Montana.

Time: 1889. Montana is admitted into the union of states after 25 years of territorial development. The new state is known as a mining and stock-raising commonwealth. Such farming as is found is largely irrigated and the census to follow in a year will show that 66.1 percent of all farms and stock ranches are irrigated.

Time: August 18, 1894. Congress passes Carey Land Act conveying to the State of Montana one million acres of arid land, to be reclaimed by irrigation and sold to settlers in parcels of not exceeding 160 acres.

The Third Impetus to Agricultural Growth

The romance of agriculture in Montana moves on. It is the dawn of a new century and the dawn of a new era for Montana. A new type of pioneer is looming on the eastern horizon. He is the dry-land settler, the third great impetus to the agricultural development of Montana. Drouth, grasshoppers, cut-worms, hail, hot winds, crop failures, foreclosures and abandonment are to challenge his very existence, in the drama that is to follow. He is its hero, idolized, victimized and villainized, with his final monument, the statistical facts of a four-fold increase in numbers of farms, a ten-fold increase in value of farm products, a stabilized livestock enterprise and an investment in Montana agriculture, at the crest, of almost a billion dollars.

The appearance of the dry-land settler is signalized by the increasing numbers of homestead entries. In the 20 years of his influx, homestead entries totalling nearly 190,000 bear eloquent testimony to his appetite for land. Between 1900 and 1920, entries number nine times as many as the total recorded up to 1900, embracing thirteen times as much acreage as was filed upon prior to that time. Two peaks in homestead filings, one in the year 1910, the largest single year's filings and the other in 1914, mark the periods of heaviest onslaughts of this army of settlers.

The Land Boom

Time: 1910. "I sold my land in Iowa for twice what I paid for land in Montana and the Montana land yields twice what the Iowa land yielded."

It is the day of "The free home in the West" and the appeal is falling upon receptive ears in the middle west. The land hungry hordes are turning their eyes to the promised land of the northwest at a time when this region is enjoying favorable climatic conditions, when big yields of grain are being obtained upon freshly broken sod and when weed and insect pests have not yet become noticeable. It is a region of cheap land that at the time is producing big yields of grain. A land boom is getting under way under a combination of favorable circumstances which will surely free from blame the brightest claim of the promoters of this new agricultural era. The expansion of ownership of land as these lands pass from the government to private citizens is to be supplemented by sales of land to settlers following that time when the choice selections of free land are gone.

Time: 1914. A distant war is promising to boost land values higher as the most desirable free lands become scarce. Big yields of grain are about to be combined with high prices and the land boom is on. Farmers are searching for additional acreage to increase their possibility of profits. Lands being patented find buyers willing to contract them at from \$25 to \$50 per acre. Money from mid-west banks and mortgage companies is flowing into Montana to finance the new agriculture. And why not, in view of the facts at hand? Who would suspect that Nature herself is abetting this hurried settlement program? From 1900 to 1914 only once has the yield of wheat gone below 20 bushels. Claims made in 1910 on the basis of the experience of the preceding decade that "The chances of crop failure or a shortage of yield in Montana are less in Montana than in other states," have been verified in the four years 1910 to 1914. The agricultural development is being recognized as the stimulant to all lines of industry in the state.

Montana Book, page 23: "The growth of Montana during the last few years has been due to the extension of agricultural and allied interests more than to any other cause the advance along agricultural lines has been phenomenal."

Farmers and business men both congratulate themselves that they are "in on the ground floor." The average character of the weather has been lost sight of and the term "dry-land farming" is said by farmers to be misleading. They want it called "non-irrigated" farming.

Time: 1915. A bumper wheat crop is being harvested. Farmer's money is being invested in tractors, automobiles, farm buildings and land. Local loan agents are competing with each other in placing credit. Close on the heels of the loan agent follow the salesmen of tractors and automobiles. Farmers are bewildered by the ease with which the credit comes. The result is human and where are those men in other lines of business who out of their own experience are qualified to cast the first stone? By comparing prevailing yields of crops and prevailing land values in Montana with the yields and values in the older farming regions of the nation, the whole story is told and it is a pessimist indeed who cannot enthuse over the yields of 1915.

Typical of the enthusiasm of the promoters of the new agriculture is the following: "This state has held first place in the production of gold, it has held first place in production of silver, it has held first place in the production of copper, it has held first place in the production of beef, it has held and still holds first place in the production of wool—but to Montana has come at last one who is greater than the miner, greater than the stockman, greater than the flockmaster. Into Montana has come the farmer, and from this day forward the agricultural industry overshadows its other activities."

Real-estate men and farmers have their photographs taken standing in oat and wheat fields where the grain is shoulder high. Other pictures portray heavy crops of grains or blossoming orchards against backgrounds of distant snow-capped mountains. There is nothing wrong with the pictures themselves, the trouble lies in the lack of other pictures which might paint other scenes not so favorable and give the other half of the evidence. Unfortunately no one notices the insufficiency of the evidence or if noticing, their voice is not heard. The enthusiasm of the promoters of agriculture in Montana is matched only by their sincerity and the available facts and general opinion.

"Infinite care has been taken to present in these pages (1915 state year book) only the unvarnished truth, facts and figures that cannot be successfully disputed. The truth is good enough about Montana; the greatest service that can be rendered this state is to tell it."—Introduction to 1915 year book.

Time: 1916. The romance of agriculture in Montana moves on. The dream of the empire builders is on the threshold of realization. It is golden harvest time in the year of 1916 and the mellowing rays of Montana's sunset slant eastward over vast expanses of ripened wheat. It is a second bumper crop twice running to whose value a distant war has added \$34,000,000 compared with the somewhat larger crop of the preceding year. The golden waves of wheat are broken by the deep bronze of sturdy flax with which many of the settlers have broken the prairie sod. A hush is in the air, a touch of frost has put to sleep the lesser insect life and there is coolness in the prairie wind that hints of autumn and winter. The dry-land farmer turns his grateful eye from earth to heaven and heaven to earth, with a song of thankfulness in his heart for the



BAD LANDS FORMATIONS

Providence that has directed his course to the land of shining mountains. He who has staked his money and his happiness on a Montana farm has already been richly rewarded.

But a grim spectre stalks in the offing, the spectre of drouth which in the next three years is to change the colorful romance into a tragedy of first order.

The Three Years of Drouth

The romance of agriculture in Montana moves into the shadowlands of disappointment, disillusionment and despair, to culminate in the disastrous year of 1919. Nature which befriended the early period of dry-land development seems determined to wreck the whole structure by the three years of drouth and crop failures at a time when with high war-prices, ordinary yields would have paid off most farm loans. In northern and northeastern Montana the drouth strikes with added force, not to end until 1922. The distress is cumulative and in 1919, following one of the worst summer drouths of record, a severe winter brings heavy losses to livestock producers, caught with short feed supplies. An economic disaster is to follow close on the heels of the climatic disaster, when in 1920 a deflation of war-time prices for farm products sets in to again rob the settler of the fruits of his toil.

Time: 1917: It is fall and the first real test of farming has come. Drouth has left many farmers without crops. Good farming has returned fair yields even under drouth conditions, but poor farming has completely failed. Farmers and business men are not depressed. One bad year is a small discouragement in view of the preceding six years of good crops.

Time: 1918. It is again harvest time and the new settler is facing a serious condition. Drouth conditions have continued from 1917. Farmers with large land holdings, with mortgages and high interest rates are finding it hard to meet payments. Cash reserves have dwindled and many farmers are without money to buy seed for the coming crop. The irrigated farms and stock ranches are relatively prosperous, and bankers and business men are standing loyally behind the dry-land farmer in the belief that he will soon come back with one good crop.

Time: 1919. Another harvest time has come, this time to set the seal of broken hope upon thousands of farm homes in the dry-land farming regions of Montana. The year has marked the third consecutive season of drouth. What the drouth has failed to do in taking the last hope from the settler, the winter of 1919-20 may yet accomplish. Snow has already arrived early in the autumn and is to remain until late in the spring. Livestock producers who have not sold their livestock are to be forced to pay high prices for feed, some are to go bankrupt in the process, others are to hold out to spring and find in a rapidly declining market that their livestock is worth less than the winter feed bill.

Time: 1920. Like gamblers risking all for a last chance, many settlers who have held on until the spring of 1920 find hope in the thought that one more crop may restore their fortunes. Farmers by now have completely exhausted their credit and reserves and banking conditions are severely strained. The harvest of 1920 arrives. In north-central Montana and some other sections the results have been another comparative failure. Moreover the high war prices of 1919 have collapsed. The state wheat crop although nearly four times larger than the failure of 1919 is selling for about half the 1919 price per bushel. Livestock prices have likewise declined.

Seed loans which made their first appearance in 1918 and had risen to a total of \$3,000,000 in 1920 are to be an emergency relief for the next decade although with much less frequent occurrence than during the first three years' experience with drouth and semi-drouth conditions such as confronted the dry-land farmer between 1917 and 1920.

Seed loans to the total of \$7,249,000 were made to Montana farmers between 1918 and 1922 as follows: 1918 (fall) \$300,919; 1919 (spring) \$2,150,000; 1920, \$3,000,000; 1921, \$1,044,578; 1922 \$755,492.

Time: 1925. Montana agriculture has spent five years in a reconstruction of ideas and methods with results already apparent. Farmers have enlarged their unit size of farm by consolidating with additional acreage leased or bought

on favorable terms. Fewer farmers have made a surprising increase in volume of production compared with the production of the larger number of farmers in 1920. Powered machinery has come to reduce production costs and hours of man power labor and to make possible the larger sized farms. Improved highways and transportation facilities are bringing the markets of the world closer to the remote homesteaders. The communities which have grown up in the agricultural regions have become farm-minded. The influence of the Agricultural College and Extension Service has broadened and there is a feeling that the whole general problem of agricultural development in Montana is at last on a permanent basis. The livestock end of the agricultural industry has likewise made adjustments and in case of the sheep industry a state of relative prosperity has followed the distress that set in with the close of the war. The general outlook for Montana agriculture has brightened considerably and while there is much discussion on the disparity between prices of farm products and prices farmers pay for non-agricultural products, the position of Montana agriculture aside from the general economic position of agriculture generally, is regarded favorably if not with a modicum of enthusiasm.

Time: 1927: Nature again has rewarded Montana farmers with one of her bounteous harvests. Farm prices in many lines are encouraging especially the price of beef which has taken a sharp rise. Sheep and wool prices are still at levels conducive to expansion of both sheep numbers and land. Dairy prices are encouraging a steady growth of dairy production while minor cash crops such as sugar beets, seed and canning peas, dry edible beans, alfalfa seed and seed potatoes are recording a marked expansion. But over-shadowing all else the big 1927 wheat crop is contributing a decided impetus to the whole agricultural industry and is to furnish the capital out of which there is to come a considerable increase in the numbers of tractors and combines during the following few years.

Time: 1929. The internal economic problems of the commonwealth seem to be on a fair way to solution with Montana people working harmoniously toward this common end. But in the great outside world an economic storm of tragic importance is brewing. Its effect on Montana agriculture within the next three years is to be one of discouragement and heartache. Like a great cloud across the sky it is to darken the sunshine of hope and to discount in large measure the progress of a decade.

Time: 1930. The census shows a total value of sales of agricultural products of nearly \$139,000,000 of which livestock sales represent but \$48,000,000. The area of land in farms has grown to nearly 45,000,000 acres compared with 33,000,000 acres in 1925 and 35,000,000 acres in 1920. The number of farms has increased slightly over the figure of 1925 but is well under the number in 1920. Agriculture's contribution to the purchasing power of the state is evidenced by the census data showing expenditures of more than \$16,000,000 for labor and \$17,000,000 for implements, machinery, automobiles, and trucks. The average size of Montana farms is 940 acres compared with 698 acres in 1925 and 608 acres in 1920. Modern highways have speeded up the transportation of farm produce to primary market and the radio and telephone have given the remote farmers an ear to the hum of the industry of the great outside world. Much of the old World War indebtedness of agriculture has been wiped out. Cattlemen are tasting the prosperity that was ushered in by the up-swing of the cattle price cycle in 1927. Sheepmen are a little worried by the clouds on the business horizon auguring a reduced demand for wool and mutton.

Time: 1931. The business depression that set in with the financial deflation of the fall of 1929, spreading through the business world has so reduced the demand for farm products as to carry prices to unexpectedly low levels. In Montana a severe drouth has reduced crop production to lowest level since 1919. A relatively short crop was harvested in 1930. A seed loan in the spring of 1931 added to the burden of debt resulting from the poor crops. Not only the farmers but stockmen as well share in the adversity of the depression. The sheep industry, facing insolvency by the decline in prices of sheep and wool to levels below production costs, faces the darkest period in its history.

Time: 1933. The romance of agriculture in Montana starting with the gold rushes, gliding through the picturesque days of cowboys, cattle barons, and Indian wars, strutting through the golden days of the land boom, staggering through the war-time disillusionment and crop failures, grappling with the great reconstruction problems of the post-war period, comes at length to another test in the great depression.

But the romance of agriculture in Montana will go on and the task that has been interrupted by the depression will not be abandoned. History alone will place the depression in its proper light along with all the other obstacles that have appeared in the pathway of the development of agriculture in Montana.

Those who have watched the progress of agriculture in Montana are not discouraged by the depression. No foreclosure can rob Montana agriculture of her picturesque setting of shining mountains and whispering prairies, and no mortgage will ever list the brightness of her sunshine nor the sweetness of her cleansing winds.

DAIRYING AN IMPORTANT INDUSTRY

AS Montana's agriculture has developed from that of an industry secondary to stock growing, and mass wheat production has to a degree given way to a more general type of farming, dairying has found more favor with the small farmer and has become one of his all-year sources of cash income.

Stockmen have added milking strains to their beef herds and the small operators have developed farm groups of milk cows in gradually increasing numbers.

Where, in 1900, Montana had but 48,500 milk cows, the U. S. census of 1930 shows that during 1929 farmers and dairymen of the state milked 173,303 dairy cows and heifers with a milk production of 87,377,918 gallons. Of this quantity 12,545,846 gallons were sold as whole milk, 13,868,373 pounds of cream were sold as butterfat and 392,988 gallons of cream were sold as other than butterfat.

On April 1, 1933, creameries to the number of 78 and cheese factories to the number of 10 were furnishing markets for the production of the dairy herds of the state.

From that of a decade ago the production of creamery butter has been more than doubled in certain years, and even in 1932, when the low price payable for butterfat under unsatisfactory marketing conditions over the country was somewhat discouraging to both the farmer and the buttermaker, the output was just a shade less than double that of 1922 when Montana creameries manufactured and marketed 7,815,847 pounds.

During the five years, 1928-1932, the annual production of creamery butter in Montana averaged 15,777,000 pounds per year, in which period the average yearly exportation of butter to markets in other states was 6,150,000 pounds, of which 80 per cent went to Pacific coast markets in California, Washington and Oregon. Within this same period factories of Montana produced an annual average of 1,869,530 pounds of cheese.

Butter and cheese production and butter exportation totals for the five years of this period follow:

Year	Butter Production (lbs.)	Cheese Production (lbs.)	Butter Exportations (lbs.)
1928.....	16,363,350	2,346,917	6,241,476
1929.....	16,684,437	1,893,494	6,929,430
1930.....	16,791,660	1,611,944	7,082,977
1931.....	14,864,154	1,609,312	5,468,068
1932.....	14,181,995	1,885,981	4,978,253

MAJOR AGRICULTURAL CROPS

Wheat Leads in Volume and Value—State Occupies Premier Position Among Producers of Hard Grains—Hay Stands Second in Importance

WHEAT constitutes Montana's major agricultural crop, with the bulk of the state's wheat acreage devoted to the growing of hard spring wheat, but with a considerable acreage in hard winter and durum wheat.

The well-earned reputation Montana has established in the wheat markets of the country and the increasing demand for its hard grain is a bright spot in the agricultural future of the state and will go a long way toward keeping wheat production profitable in the years to come. Prices paid to producers of Montana wheat because of its high quality have some years very much more than offset the longer haul to terminal markets, and, coupled with lower land values have enabled farmers here to compete with those in other states more favorably located as to markets and with those in states having a higher average per acre yield.

Measured by a single standard, the same by which all wheat in the United States is measured, Montana has produced a greater proportion of No. 1 wheat than any state in the Union. Crops and Markets, a publication of the United States Department of Agriculture, gives Montana, under the application of the U. S. Grain Standards, a greater percentage of No. 1 spring wheat than any other important wheat producing state in seven of the eight years, 1923-1930, and a greater percentage of No. 1 wheat including all classes five of those eight years.

Quality Measured by Protein Content

A factor of great importance in the price returned to producers which is not embodied in the United States grain standards is the amount of protein the wheat contains. This factor has been employed for many years in determining the premium paid at terminals and in more recent years at country markets, over the prices quoted for each U. S. grade. At times during the past 10 years the premium has been as high as a cent per bushel for each tenth of one percent of protein over stated minimum and up to stated maximum amounts. The bulk of Montana wheat is of high grade and most of it receives a premium over the top grade. Consequently Montana producers have received more benefit from protein than have producers in other states, the wheat being both of higher grade and higher protein content.

The following figures were compiled for 1923 to 1927, inclusive, by the Department of Agronomy, Montana State College, while those for 1928 to 1930, inclusive, were obtained from the Minnesota grain inspection department, and show by percentage the average protein content of wheat grown in each state each year.

	1923	1924	1925	1926	1927	1928	1929	1930
MONTANA	13.12	13.55	14.25	13.91	12.21	12.65	15.30	16.05
No. Dakota	13.29	11.33	12.30	14.23	11.82	12.15	13.75	14.85
So. Dakota	*	*	*	*	*	12.60	13.65	15.62
Minnesota	*	11.50	11.67	12.74	*	12.35	12.05	13.04

(*) Indicates data not available.

Montana had the highest average protein content six out of eight years as compared to North and South Dakota and Minnesota, the only other important producing states that grow the same class of wheat, namely, hard red spring.

The State's Wheat Production

In the 10 years, 1923 to 1932, inclusive, within which period extremely good and poor crop years have been experienced and when the state's production ranged from the low of 14,478,000 bushels to the high of 81,713,000 bushels, the average yearly production was 48,685,000 bushels taken from an average acreage of 3,654,600. The average per acre yield for the 10-year period was 13.3 bushels.

The acreages, yields per acre and total production of all classes of wheat in Montana from 1880 to 1932 follow:

ALL WHEAT			
	Acreage	Av'rge Yield Per Acre (Bu.)	Production
1880	19,000	23.5	446,000
1890	33,000	20.0	660,000
1900	100,000	21.5	2,150,000
1910	435,000	21.1	9,160,000
1911	660,000	25.0	16,480,000
1912	975,000	24.1	23,505,000
1913	1,300,000	23.0	29,870,000
1914	1,655,000	19.3	31,932,000
1915	2,375,000	25.5	60,575,000
1916	2,380,000	19.1	45,500,000
1917	2,785,000	10.5	29,365,000
1918	3,400,000	12.6	42,800,000
1919	1,698,000	5.0	8,493,000
1920	3,608,000	12.4	44,768,000
1921	3,435,000	12.2	42,034,000
1922	3,358,000	15.6	52,533,000
1923	3,274,000	15.0	49,107,000
1924	3,130,000	16.1	50,422,000
1925	3,249,000	10.8	34,998,000
1926	3,590,000	12.5	44,773,000
1927	4,020,000	20.3	81,713,000
1928	4,395,000	18.0	79,146,000
1929	4,419,000	9.3	41,290,000
1930	4,217,000	8.4	35,313,000
1931	2,182,000	6.6	14,478,000
1932	4,070,000	13.7	55,610,000

Corn and Hay

Corn acreage has shown a remarkable expansion since 1900, increasing from but 3,000 acres in that year to about 400,000 acres in 1924, with a slump to 215,000 acres in 1932.

The importance of the development of the corn crop in Montana does not lie in its contribution as a cash grain crop, the percentage used in this way being very small, but in the fact that in corn the Montana farmer has found a valuable feed crop for his farm animals as well as an alternative crop for his small grain acreage, which improves soil and helps control weeds.

Tying up with the increase in corn acreage are such important changes as big gains in farm breeding of hogs, and a general increase in the number of milk cows on farms. In the increase, therefore of corn acreage is to be seen the drift of Montana farming from the older type of grain farming, often called the single crop system, to a more diversified type on the smaller sized farms.

It is only since 1914 that hay has ceased to be the leading crop of the state, both in acreage and in total value.

Since 1914 wheat has been the most important crop and in 1917 exceeded hay in value by \$46,000,000. The acreage of tame hay has increased with the expansion of irrigated lands, and the more modern methods of cultivating non-irrigated areas, while wild hay acreage has remained quite constant, variations in production being dependent upon rainfall.

Hay is produced chiefly for feeding within the state and very little seeks outside markets. In 1932, 2,514,000 tons were produced on 1,654,000 acres, the average yield being 1.46 tons.

Approximately half of the tame hay acreage is alfalfa, the remainder being in hay grains, sweet clover, timothy, clover, millets and a few others. The bulk of the acreage devoted to tame hay is found in the irrigated sections.

Wild hay grows in most sections of the state. In some places wild hay is an important crop, where it is produced in connection with the livestock industry. The wild hay of Montana is largely native blue-joint, and is noted for its high nutritive value. Stock readily takes on fat when fed this wild hay alone, while it supplies the proper nutrients for growth of young animals.

Alfalfa is the leading forage crop under irrigation and under non-irrigated conditions, where moisture conditions above the average are assured, this crop has little competition.

	CORN			HAY (Tame)		
	Acreage	Average Yield Per Acre (bushels)	Production (bushels)	Acreage	Average Yield Per Acre (tons)	Production (tons)
1890				85,000	1.80	153,000
1900	3,000	15.0	45,000	85,000	1.60	488,000
1910	16,000	23.0	368,000	595,000	1.40	833,000
1911	20,000	26.5	530,000	605,000	2.00	1,210,000
1912	24,000	27.5	660,000	640,000	1.90	1,216,000
1913	30,000	29.0	870,000	660,000	1.80	1,188,000
1914	53,000	25.0	1,325,000	700,000	1.85	1,295,000
1915	64,000	25.0	1,600,000	775,000	2.00	1,550,000
1916	67,000	22.0	1,474,000	825,000	1.70	1,402,000
1917	81,000	12.5	1,012,000	860,000	1.40	1,204,000
1918	100,000	21.0	2,100,000	865,000	1.60	1,384,000
1919	82,000	8.5	697,000	1,029,000	1.05	1,080,000
1920	165,000	16.0	2,640,000	1,086,000	1.57	1,706,000
1921	215,000	16.0	3,440,000	1,097,000	1.59	1,747,000
1922	258,000	20.0	5,160,000	1,054,000	1.72	1,808,000
1923	349,000	20.5	7,154,000	1,096,000	1.87	2,051,000
1924	401,000	14.0	5,614,000	1,206,000	1.66	2,002,000
1925	289,000	11.5	3,324,000	1,221,000	1.54	1,885,000
1926	202,000	9.0	1,818,000	1,247,000	1.48	1,848,000
1927	152,000	18.5	2,812,000	1,238,000	2.03	2,514,000
1928	122,000	15.0	1,830,000	1,261,000	1.81	2,279,000
1929	134,000	12.0	1,608,000	1,440,000	1.21	1,737,000
1930	141,000	12.0	1,692,000	1,619,000	1.20	1,946,000
1931	123,000	14.0	1,722,000	1,636,000	1.01	1,648,000
1932	215,000	12.0	2,580,000	1,654,000	1.46	2,418,000

Oats and Barley

Oats primarily is grown as a farm feed in Montana, although a varying percentage usually less than 20 per cent is sold, depending largely upon market prices. Acreage of oats ranks about third among Montana crops, being exceeded by wheat and hay. Considering its total value including that of farm feed, it also ranks about third in annual crop values.

Displacing of the farm and draft horse by the gasoline tractor and truck has greatly reduced the demand for oats and as a result Montana's high production of 25,650,000 bushels in 1915 dropped to 10,075,000 in 1932.

Montana oats test usually well above the standard bushel weight and in this respect are above the average of the entire United States, with no other state equaling Montana except Wyoming. Over a period of 10 years Montana oats have an average weight per bushel of 36.5 pounds compared with the average of all United States of 32.0 pounds, the standard weight per bushel.

Montana produces a very high quality barley of a type which was largely in demand for malting during the pre-Volstead years, since which it has dropped to the class of an exclusive feed crop. In 1927 when the state produced one of its heaviest crops of barley, 6,435,000 bushels, averaging 33 bushels to the acre, the state ranked tenth in production in the United States. In the less favorable crop year of 1932, with the same acreage as that harvested in 1927, the production was slightly under 4,000,000 bushels with a per acre average of 20 bushels.

In weight per measured bushel Montana barley also ranks high, a five-year average being 49.0 pounds for Montana compared with 45.9 pounds for the United States.

	OATS			BARLEY		
	Acreage	Average Yield Per Acre (bushels)	Production (bushels)	Acreage	Average Yield Per Acre (bushels)	Production (bushels)
1890	77,000	34.0	2,618,000	6,000	37.5	225,000
1900	150,000	32.5	4,875,000	20,000	31.0	620,000
1910	385,000	33.0	12,705,000	30,000	19.5	585,000
1911	410,000	41.0	16,810,000	31,000	27.0	837,000
1912	460,000	44.0	20,240,000	37,000	30.5	1,128,000
1913	520,000	40.0	20,800,000	41,000	29.0	1,189,000
1914	560,000	35.0	19,600,000	45,000	26.5	1,192,000
1915	570,000	45.0	25,650,000	50,000	35.0	1,750,000
1916	630,000	38.0	23,940,000	55,000	30.0	1,650,000
1917	640,000	20.0	12,800,000	62,000	16.0	992,000
1918	650,000	28.0	18,200,000	55,000	24.0	1,320,000
1919	304,000	13.5	4,104,000	30,000	12.0	360,000
1920	572,000	30.0	17,160,000	64,000	18.0	1,152,000
1921	629,000	24.0	15,096,000	75,000	20.5	1,538,000
1922	579,000	32.0	18,528,000	68,000	24.0	1,632,000
1923	591,000	33.0	19,503,000	85,000	25.5	2,168,000
1924	550,000	26.0	14,300,000	101,000	20.5	2,070,000
1925	537,000	22.5	12,082,000	141,000	21.0	2,961,000
1926	482,000	26.0	12,532,000	150,000	24.0	3,600,000
1927	414,000	39.0	16,146,000	195,000	33.0	6,435,000
1928	348,000	36.5	12,702,000	215,000	30.0	6,450,000
1929	321,000	19.0	6,099,000	258,000	16.0	4,128,000
1930	305,000	17.5	5,338,000	232,000	16.5	3,828,000
1931	183,000	17.5	3,202,000	139,000	15.0	2,085,000
1932	403,000	25.0	10,075,000	195,000	20.0	3,900,000

Rye and Flax

Rye is grown in Montana largely to be cut as hay or as feed for hogs. With the low price for pork in recent years the requirements have decreased with the result that where 120,000 acres were harvested for grain in 1922, only 40,000 acres were harvested in 1932. Both winter and spring sown rye are grown in Montana, the fall sown rye making up the bulk of the total. Estimates of rye acreage exclude that cut for hay. The practice of cutting rye for hay is general in some of the drier sections of the state where grass growth is short.

	RYE			FLAX		
	Acreage	Average Yield Per Acre (bushels)	Production (bushels)	Acreage	Average Yield Per Acre (bushels)	Production (bushels)
1900	2,000	7.0	14,000			
1910	6,000	15.7	94,000	200,000	6.0	1,200,000
1911	8,000	19.1	153,000	270,000	8.0	2,160,000
1912	10,000	17.8	178,000	325,000	12.0	3,900,000
1913	13,000	17.2	224,000	320,000	9.0	2,880,000
1914	16,000	18.8	301,000	255,000	8.0	2,040,000
1915	21,000	18.4	386,000	250,000	10.5	2,625,000
1916	30,000	17.5	525,000	320,000	9.5	3,040,000
1917	29,000	16.8	487,000	500,000	3.0	1,500,000
1918	54,000	11.2	605,000	470,000	5.0	2,350,000
1919	76,000	3.0	228,000	160,000	2.5	400,000
1920	91,000	9.0	819,000	260,000	3.5	910,000
1921	114,000	11.5	1,311,000	110,000	5.2	572,000
1922	120,000	15.0	1,800,000	84,000	7.0	588,000
1923	60,000	11.0	660,000	110,000	8.0	880,000
1924	40,000	13.0	520,000	246,000	7.5	1,845,000
1925	50,000	12.0	600,000	190,000	4.0	760,000
1926	65,000	12.0	780,000	145,000	4.5	652,000
1927	78,000	17.0	1,326,000	165,000	10.0	1,650,000
1928	90,000	13.5	1,215,000	183,000	8.5	1,556,000
1929	67,000	7.5	502,000	362,000	3.3	1,195,000
1930	68,000	8.0	544,000	481,000	3.7	1,780,000
1931	20,000	4.5	90,000	178,000	2.6	463,000
1932	40,000	13.0	520,000	285,000	3.5	998,000

Flax, an important cash crop in eastern and northeastern counties, reached its peak in acreage in 1917 when 500,000 acres were devoted to its cultivation, since which time the acreage has fluctuated between 84,000 and 481,000 acres. It is the most popular crop for newly broken sod land and will average 10 or more bushels to the acre during the first few years of utilization of new land.

Practically all of the state's production, except that saved for seed, is shipped to outside markets where it is in good demand, as flax seed crushers find that Montana seed produces more oil per bushel than does seed grown farther east or south.

Potatoes and Beans

While Montana has not gone so extensively into the potato marketing industry as have other northwestern states, due largely to the lack of potato grading laws prior to 1933, Montana grown certified seed potatoes have become in great demand in the southern early potato growing sections. Commercial potatoes of the state have an advantage in the middle-western markets in that they can be marketed in the spring in practically as firm a condition as when dug the preceding fall.

Within recent years the growing of Great Northern beans was begun in a small way in the Yellowstone valley. The trend of production in the state has been sharply upward since this small beginning until today Montana stands next to Idaho in the growing of Great Northerns.

Great Northern beans are grown both on dry and irrigated land, principally in the southeast quarter of the state. It is, however, on the irrigated land in the vicinity of Billings where growing of the crop is most assured, and where the industry really centers. Yellowstone is the most important single county for this crop. That Montana is now a state to be recognized as a bean producing area is evidenced by the fact that in 1930 on 49,000 acres the crop averaged 18 bushels to the acre, giving a total crop of 882,000 bushels.

	POTATOES			BEANS		
	Acreage	Average Yield Per Acre (bushels)	Production (bushels)	Acreage	Average Yield Per Acre (bushels)	Production (bushels)
1890	4,000	117	468,000			
1900	10,000	125	1,250,000			
1910	19,000	112	2,128,000			
1911	21,000	136	2,856,000			
1912	26,000	172	4,472,000			
1913	25,000	147	3,675,000			
1914	26,000	148	3,848,000			
1915	27,000	170	4,590,000			
1916	26,000	156	4,056,000			
1917	32,000	115	3,680,000			
1918	29,000	165	4,785,000			
1919	23,000	75	1,725,000			
1920	24,000	110	2,640,000			
1921	25,000	115	2,875,000			
1922	29,000	128	3,712,000	20,000	13.0	260,000
1923	23,000	110	2,530,000	23,000	11.0	253,000
1924	21,000	87	1,827,000	23,000	9.0	207,000
1925	22,000	108	2,376,000	25,000	14.5	363,000
1926	21,000	85	1,785,000	22,000	14.0	308,000
1927	22,000	140	3,080,000	24,000	18.0	432,000
1928	23,000	115	2,645,000	31,000	16.5	512,000
1929	21,000	89	1,869,000	46,000	15.5	713,000
1930	18,000	98	1,764,000	49,000	18.0	882,000
1931	19,000	85	1,615,000	37,000	16.0	592,000
1932	22,000	102	2,244,000	24,000	18.0	432,000

LEADS WORLD IN QUALITY GRAINS

Farmers of State are Consistent Winners of Championship Awards on Wheat and Other Seeds at International Expositions

IN the period of Montana's agricultural history since it became one of the major wheat growing sections of the nation, particularly since 1900, the state has forged to the front as a producer of high quality grains and small seeds until it has become recognized as a leader and its products have been brought into demand in all those states where hardy and virile seeds are required.

Aside from benefiting through the market premiums generally paid for Montana seeds its reputation as a high quality seed growing territory has been established throughout the nation by the consistent capturing, year after year, of hundreds of high awards, including many championships, at interstate or international expositions.

Montana's high standing in agricultural winnings in competition with national or international antagonists may be reckoned as having its beginning with the Chicago World's fair in 1893 with two high awards in wheat, four in barley, three in hay and four in flour.

At the Louisiana Purchase Exposition, St. Louis, in 1904, Montana agriculturists won 69 gold medals, 62 silver medals and 53 bronze medals.

In 1905, at the Lewis and Clark Centennial Exposition, Portland, Ore., Montana agriculture captured 77 medals, of which 62 were gold, 13 silver and 2 bronze.

Three sweepstakes cups of great value for grains grown in the United States in 1911 were awarded to Montanans at the Land Show in New York City of the same year. Of these the James J. Hill \$1,000 cup for the best 100 pounds of wheat was won by James Todd, of Geyser; the A. J. Earling \$1,000 cup for the best 100 pounds of oats was won by Hartman and Patton, of Bozeman, and the Gustav Pabst \$1,500 cup for the best bushel of barley was won by R. Eisinga, of Manhattan.

Best in Hard Wheat Territory

At the Land Products Show, St. Paul, in 1911, Montana took the sweepstakes cup for the best exhibits of products from any one state. The cup for the best bushel of winter wheat grown in the American Northwest was awarded Frank Smart of Bozeman, that for the best sample of barley grown in Montana or North Dakota went to John Klaver, of Manhattan, and that for the best individual exhibit of potatoes was won by Pat Carney, of Waterloo.

The grand prize, a \$5,000 tractor, awarded at the Minneapolis Land Show in 1912 for the best five bushels of wheat grown in the American Northwest, was won by Nash and Bridgeman, of Clyde Park.

Montana was awarded the grand prize for the best exhibit of cereals at the Panama-Pacific International Exposition, San Francisco, in 1915, along with individual winnings of 73 gold medals, 236 silver medals and 195 bronze medals, while 15 gold medals were won by Montana exhibitors the same year at the Panama-California Exposition in San Diego.

During the World War period no occasion for national or international competition presented itself and it was not until 1919, with the opening of the International Grain and Hay Show as a branch of the International Livestock Exposition, Chicago, that Montana farmers found occasion to show their products against those of other growers of the world.

Many World Championships

In the 14 successive years the International Grain and Hay Show has been conducted Montana has demonstrated its supremacy over other grain and seed producing states in the growing of quality seed, has proven a most able competitor for the great wheat growing provinces of western Canada, and has captured the bulk of the grain awards at most of the shows during that period.

In those 14 years Montana farmers have won four world sweepstakes championships and seven reserve championships on wheat, leaving but three years out of the 14 when her top sample of wheat was not declared either the best or the second best on exhibition.

During this same period Montana has won eight world championships and six reserve championships on barley, five world championships and three reserve championships on oats, two world championships on flax, two world championships on rye, four world championships on timothy seed, two world championships and one reserve championship on alfalfa seed and two reserve championships on field beans.

VEGETABLE AND FRUIT CANNERIES

WHILE commercial canning of vegetables and fruit in Montana has been going on for more than a score of years the undertaking is still in the nature of an infant industry which is largely dependent upon the growth of population within the trade area which may be supplied upon a reasonable freight rate basis.

Montana is conceded, by reason of the soil, sunshine and water conditions of some of her rich irrigated valleys, to produce the finest grade of canning peas grown anywhere in the United States. This claim is supported by the fact that growers in other states look to Montana for their supply of seed peas and the growers of this state regularly furnish approximately half of the seed required in the great pea canning areas of other states.

Peas for canning, along with other vegetables which enter into the packing operations of the five factories operating within the state, are grown largely in the Bitter Root valley of Ravalli county, in the Gallatin valley of Gallatin county, and in the Rock creek valley of Carbon county.

In these irrigated sections canners annually contract with growers for the production of the several classes of vegetables from a given acreage and at an established price. Their sales are made upon a cash basis and annually bring to the growers hundreds of thousands of dollars.

A Variety of Crops Packed

Besides peas, which leads in the commodity packed in Montana, the output of the several factories include string beans, sweet corn, carrots, pumpkin, sauer kraut, dill pickles, pork and beans and sour cherries. Due to the lowering of the purchasing power of the American public and to a heavy carryover from preceding years of high production, the output of the Montana canneries has been restricted during the years 1930, 1931 and 1932, in which years the combined packs in number of cases were as follows:

1930—peas 367,816, beans 67,926, corn 23,600, carrots 600, pumpkin 9,500, kraut 13,600, cherries 8,752, total 491,194.

1931—peas 264,525, beans 28,310, corn 21,000, pumpkin 2,000, pork and beans 10,000, kraut 5,896, cherries 6,131, total 337,862.

1932—peas 264,442, beans 11,082, corn 21,000, pork and beans 5,000, kraut 3,500, dill pickles 1,000, cherries 3,816, total 309,840.

Canneries are located at Bozeman in the Gallatin valley, at Stevensville and Hamilton in the Bitter Root valley, at Red Lodge in the Rock creek valley, and at Billings in the Yellowstone valley.

SUGAR BEETS AND BEET SUGAR

BEET sugar has been an important industrial product of Montana since 1906 when the first refinery was built by the Great Western Sugar Company at Billings in south-central Montana, since which time the acreage devoted to the growing of beets has expanded and has encouraged the construction of three additional factories, one built in 1925 at Sidney in eastern Montana by the Holly Sugar Corporation, one built the same year at Chinook in northern Montana by the Utah-Idaho Sugar Company, and one built in 1928 at Missoula in western Montana by the Amalgamated Sugar Company.

The expansion of the beet growing industry in that period has been most marked, the sale of beets to the sugar refiners in 1932 having grown to approximately seven times that of 1909, which the U. S. census of 1910 shows to have been 108,776 tons. In 1932 beets were raised upon 2448 irrigated farms in the state with a total production of 747,237 tons. The value of the 1932 crop represented in cash payments by the sugar refiners, was approximately \$3,500,000.

Production Steadily Increasing

Actual data upon sugar beet production in the state for the years 1930, 1931 and 1932, at a time when other classes of farm products were dwindling in volume and market values, follow:

1930—No. of farms 2081, acreage 45,454, total production 577,096 tons, average per acre production 12.774 tons, average sugar content of the four factory areas 15.5 to 16.47 per cent.

1931—No. of farms 2199, acreage 52,863, total production 600,548 tons, average per acre production 11.36 tons, average sugar content of the four factory areas 16.68 to 17.33 per cent.

1932—No. of farms 2448, acreage 54,513, total production 747,237, average per acre production 13.7 tons, average sugar content of the four factory areas 16.10 to 17.87 per cent.

The bulk of the Montana crop is grown in the valleys of the Yellowstone, Milk, Bitter Root, Flathead and Big Horn rivers, with lesser quantities produced in other smaller irrigated sections within a radius of 150 miles of the factories.

Output of the Sugar Refineries

In 1930 the four Montana sugar refineries produced 149,324,400 pounds of sugar, in 1931 the output reached 184,459,800 pounds, while in 1932 it was pushed up to 215,645,300 pounds. During the 1932 refining period these plants gave employment to 1,165 men and women.

The sugar beet crop is one of the certain cash crops of the Montana farmer and as acreages and prices are fixed in the contract entered into between the grower and the refiner in advance of the planting season the grower has a fairly definite knowledge as to what he will receive for his labors, aside from the variations of yield and sugar content.

In addition to the millions of dollars paid annually direct to the growers vast sums are paid by the refiners each season in wages of factory employes and in railroad freight upon shipments of beets, coke, coal, lime rock and other supplies required in refining, in shipments of refined sugar and beet pulp, and in the purchase of other supplies and materials.

Hand in hand with the development of sugar beet raising in Montana has gone the development of winter feeding and fattening of cattle, sheep and hogs in the factory areas of the state.

More than 100,000 head of sheep and lambs have been fattened in these areas each year for the past several years and an average of about 30,000 head of cattle have been fed for market with beet pulp as the basis of the fattening ration.

IRRIGATION IN MONTANA

State's Agriculture Built Around Irrigation Program—Irrigated Valleys Mainstays of the Commonwealth—Over 1,500,000 Acres Watered

By J. S. JAMES

State Engineer

FROM the time of the first settlement in the state, irrigation has been a controlling factor in Montana's agricultural development. Early settlement was confined to stream valleys where irrigation was readily available, except for some isolated ranches which were centered on small irrigated tracts. In the minds of the pioneer settlers, agriculture, especially ranch or farm home building, without irrigation was unthinkable.

Experience has modified this view. Many farming areas have proven successful without irrigation. Still, for much of the state, it remains true that a permanent successful home building agriculture must be centered around some form of irrigation. Experience has also taught much of the economics of irrigation development and of the application of various forms of this development to different conditions.

Early irrigation in stream valleys largely exhausted the resources for cheap development. Following this, large areas were developed, utilizing expensive water supplies from storage or diversion from distant sources. This development has been relatively costly. Experience with it has shown the general truth of two statements: first, such projects are, without exception, worth their cost or many times their cost in indirect benefits to the public, the community, state and nation; second, with few exceptions, the cost of such development has been greater than the land alone can directly repay. Recognition of these two facts must be the basis of plans for future development of this kind, involving elaborate works for flood and stream control.

Major Irrigation Projects

The planning of these large projects is based on an almost standardized conception of irrigation, the supplying of ample water for the intensive development of the whole area involved. This conception is borrowed from the regions of desert or truly arid conditions. While it may be economically not wholly applicable to semi-arid conditions, and may be modified in future plans, present development along these lines is amply justified in established results.

Permanent, all-season irrigation on these projects and through the earlier indivi-



dual, partnership and cooperative ditches is supplied to more than 1,500,000 acres of land. This is a small percentage of the area of the state, but it stabilizes the whole agricultural structure. It is noteworthy that there is no record of public charity or relief being required by any farmer on this area during the recent trying times.

This form of irrigation is being extended and perfected by completion of unfinished projects, by rehabilitation of financially distressed projects and by improvements in works and supplemental water supplies. Such extension and perfection of existing projects will add probably another 1,500,000 acres to this irrigated area. Susceptible to future development of this kind, when the economics of the problem can be properly solved, are probably another 3,000,000 acres.

Possibilities of Spot Irrigation

Another form of irrigation has commanded increasing interest lately and will be of greatest importance in the immediate future. This is what might be called "spot irrigation." It is the irrigation to whatever extent possible of small or more or less isolated tracts. Through the dependable and diversified production of one of these tracts, the use of a large surrounding area of non-irrigated land is stabilized. The smallest of such tracts make possible home gardens and keeping of domestic livestock. Larger ones furnish dependable winter feed for commercial livestock and such cash crops as alfalfa and sweet clover seed. This form of irrigation stabilizes grain farming in the wheat areas, and in the areas of generally rough and marginal or sub-marginal lands, makes possible their proper utilization for grazing. In such areas, the marginal land is thus taken out of the wheat raising program.

This "spot irrigation" may be by pumping or by artesian flow from wells in certain very limited areas and by pumping on the isolated bottoms of the lower Missouri and similar locations. However, the most general application of this enterprise is through "flood irrigation." This consists of utilizing the flood flow of coulees and intermittent streams by direct diversion to the land or by storing such flood water in reservoirs or by a combination of these methods. This form of irrigation is not new. Many of the pioneer ranches were developed around centers of dependable production made possible by flood irrigation. However, interest has increased and application of this method spread over increasing areas of the state during the last few years, largely through the activity of the Agricultural Extension Service. Many thousands of acres are being brought under this kind of irrigation every year. This activity is reclaiming vast areas from precarious wheat production to the building of permanent ranch homes. It is renewing the livestock industry in these areas and making possible a diversity of production. In the great wheat growing areas it is releasing the farmer from a one-crop limitation and making possible attractive homes with gardens and trees.

Benefits of Supplemental Irrigation

In the fine grained soils, general over eastern Montana, where flood irrigation is properly applied, one thorough saturation of the ground from melting snow or spring rains insures a profitable crop of alfalfa hay or seed, or potatoes. If this one irrigation is supplemented—as it usually is—by floods from summer cloudbursts, additional hay crops are secured. Such flooding assures the maintenance of trees and shrubs. Where the free flooding is supplemented by small storage reservoirs, it provides a nearly continuous supply for gardens. In its simplest form, flood irrigation may be developed by the individual farmer with no cash outlay and no outside assistance, except, if he be inexperienced, some

advice and assistance in laying out his system. More elaborate systems, utilizing larger streams or coulees will require cooperation of several individuals and perhaps some cash expense in structures and, especially if reservoirs are constructed, some engineering advice. In general, even for the more elaborate systems, flood irrigation will be self-liquidating, the increased and better diversified production readily paying the construction cost. This development offers almost unlimited possibilities in the better utilization of great areas not served with perennial streams.

Irrigation in Montana, in whatever form, does not add to embarrassing agricultural surplus, but tends to balance agricultural production. Its further extension will reduce the production of the principal surplus crop, wheat, by releasing the land from its former one-crop limitation. Most important of all, irrigation removes the recurrent horror of drought and privation. While decreasing, rather than increasing competition with other agriculture, it builds up substantial communities and makes dependable markets for the products of other states.

Large Organized Irrigation Projects

The following data on some of the larger organized projects is taken from Bulletin No. 124, Montana Extension Service, "An Inventory of Montana Irrigation Projects," by R. B. Tootell:

Name of Project	Kind of Organization	Location (County)	Approximate Acreage	
			Eventually Irrigable	Now Irrigated
Bitter Root	Irrigation District (Fed. Refinance)	Ravalli	18,460	15,000
Bynum	Irrigation District	Teton	21,200	16,000
Huntley	U. S. Reclamation (Dist. Organization)	Yellowstone	32,000	24,000
Lower Yellowstone...	" "	Richland	47,450	40,000
Milk River	" "	(partly in N. D.) Blaine, Phillips, Valley	103,600	41,000
*Sun River	" "	Cascade, Teton	104,100	31,500
†Blackfeet	U. S. Indian	Pondera, Glacier	118,500	6,000
†Crow	" "	Big Horn	63,400	20,000
*Flathead	" "	Lake	124,500	50,000
†Fort Belknap	" "	Blaine, Phillips	25,285	12,000
†Fort Peck	" "	Roosevelt	36,000	2,500
Valier	Carey Act Corporation	Pondera	80,000	60,000
Big Timber	" " "	Sweet Grass	10,000	5,000
Billings Bench	Water Users' Ass'n Built as Carey Act	Yellowstone	19,000	19,000
Big Ditch Group	Land Owners' Corp.	Yellowstone	35,000	35,000
Two Leggin	Water Users' Ass'n	Big Horn	20,000	20,000
		TOTALS.....	858,495	397,000

*Sun River project and Flathead incomplete as to storage or laterals.

†Indian projects show small percentage of use on account of the type of ownership of land and incompleteness of projects.



MONTANA PUREBRED CATTLE GRAZING IN THE FOOTHILLS

LIVESTOCK MAJOR INDUSTRY

*Hundreds of Thousands of Cattle and Hogs Turned Off Annually
State Stands Second in Sheep Numbers and Wool
Production—Freedom from Disease*

BY reason of the large area of grazing land, privately owned, state owned, or within national forest areas upon which permits are obtainable for regulated grazing, the growing of livestock is one of the leading industries in Montana. Although the day of the free open range when immense herds of beef cattle roamed at will over the vast area of the public domain has long since passed, the number of cattle within the state has increased, thousands of small farm herds making up for the loss of the big range holdings.

On January 1, 1933, Montana had 1,378,000 head of cattle, the largest number since 1922, as against the peak population of 1,610,000 head on January 1, 1919. Of these, beef cattle led with 1,183,000, as against the state's record population of 1,447,000 in 1919, while milk cattle totaled 195,000 head, as against a peak population of 225,000 in 1926.

Beef fattened upon the ranges of Montana have always found ready and immediate sale upon the fat stock markets of the country, hundreds of trainloads being shipped to Chicago, Kansas City, Omaha, the Twin Cities and other points.

Over 300,000 Marketed Annually

During the past 13 years, 1920 to 1932 inclusive, shipments of beef cattle to market have averaged 307,846 head annually, the heaviest export in the history of the industry having been 504,000 head in 1926 during the liquidation period.

In 1932, with extremely low prices prevailing, Montana exports of beef cattle aggregated 215,000 head.

Marketings of Montana beef cattle in the chief slaughter centers, according to brand inspection records, for the years 1920 to 1932 inclusive, were as follows:

1920.....	211,000	1925.....	407,000	1930.....	295,000
1921.....	147,000	1926.....	504,000	1931.....	310,000
1922.....	246,000	1927.....	330,000	1932.....	215,000
1923.....	343,000	1928.....	244,000		
1924.....	321,000	1929.....	329,000		

Over a period of 11 years, 1920 to 1930 inclusive, percentages of the classes of cattle exported for slaughter, according to records of brand inspections in the office of the Montana Livestock Commission, were as follows:

Steers 56.33 per cent, cows 36.59 per cent, calves 5.47 per cent, bulls 1.61 per cent.

High in Sheep and Wool Production

Montana stands second among the states of the Union in its sheep population and wool production. The sheep population of the state on January 1, 1933, was 4,059,000 head, the largest number with but one exception since 1913. Montana's greatest sheep population, 6,417,000 was counted January 1, 1901.

In 1932 Montana flockmasters sheared 3,400,000 sheep which produced 32,300,000 pounds of wool in fleeces averaging 9½ pounds, the highest average for any of the 13 western states. During that year more than one and a half million sheep were shipped to market.

The state's annual wool production, 1920 to 1932 inclusive, follows:

1920 16,800,000 lbs.	1925 20,640,000 lbs.	1929 31,415,000 lbs.
1921 17,052,000 lbs.	1926 23,320,000 lbs.	1930 34,034,000 lbs.
1922 19,043,000 lbs.	1927 24,166,000 lbs.	1931 38,313,000 lbs.
1923 18,751,000 lbs.	1928 26,626,000 lbs.	1932 32,300,000 lbs.
1924 19,522,000 lbs.		

Hogs Fifth in State Values

Hog numbers in Montana gained materially up to 1929 until receipts from sales became fifth among the cash income sources of the livestock industry. The highest point was reached in January, 1929, when the number of stock hogs was 328,000 head. A downward swing in numbers since that time carried the January, 1933, inventory to 227,000 head, the lowest since 1923.

Hog production in Montana in 1932 was not nearly as profitable as in previous years due to the extremely low market prices. Shipments to outside markets were about 108,000 smaller in 1932 than in 1929, being placed at 80,000 head compared with 188,000 head for 1929.

Shipments of Montana hogs to outside markets during each of the years 1920 to 1932 inclusive were:

1920.....	15,000	1925.....	164,000	1930.....	147,000
1921.....	27,000	1926.....	126,000	1931.....	202,000
1922.....	59,000	1927.....	86,000	1932.....	80,000
1923.....	119,000	1928.....	180,000		
1924.....	197,000	1929.....	188,000		

Horses and Mules

Horse numbers in Montana continue to decline in face of competition of the tractor and automobile. Horse raising as an industry, once a ranch enterprise in Montana, has almost disappeared and most of the breeding today is merely for replacement of work stock. Nevertheless, horses still contribute some share of the annual agricultural income. Unclaimed horses on Montana ranges in recent years have been rounded up and shipped to canning factories. Horse numbers in Montana have declined from the peak of 720,000 head in 1919 to 380,000 in 1933.

Mules have never been generally adopted in Montana as work animals but considerable numbers have been bred for disposal in the corn and cotton growing states of the south. From a peak of 11,000 head the mule population of the state has dropped to around 8,000 head.

Freedom from Livestock Diseases

Montana livestock is as nearly disease-free as is humanly possible as the result of the activities of the Montana Livestock Sanitary Board which is commissioned with the duty of preventing, controlling and eradicating diseases of livestock. It is also the duty of the sanitary board to promulgate and enforce rules, regulations and orders for the proper supervision, inspection and control of slaughter houses, meat depots, meat and meat food products, dairies, milk depots, milk and its by-products, barns and dairy cows, and to tuberculin test all dairy cattle. In all work the sanitary board cooperates with the United States Bureau of Animal Husbandry under a written working agreement.

One of the big tasks of the sanitary board has been that of eradicating tuberculosis in dairy herds and after many years of endeavor approximately 20 counties are now classed as tuberculosis free accredited areas. In 1931 the surgeons of the board inspected 142,853 head of dairy cattle of which but 22/100ths of one per cent were found to be reactors, while in 1932 in the examination of 82,649 head but 12/100ths of one per cent were found to be reactors.

As further results of the work of the sanitary board cattle scabies has been completely eliminated, sheep scabies has not existed in the state within the past 13 years, not a case of anthrax has been discovered within three years, while dourine and glanders in horses, and rabies have been completely eradicated.

The board maintains a laboratory at the capitol where 47,793 tests were made during 1931 and 1932. During the same period field inspections were made of 4,142,098 animals.

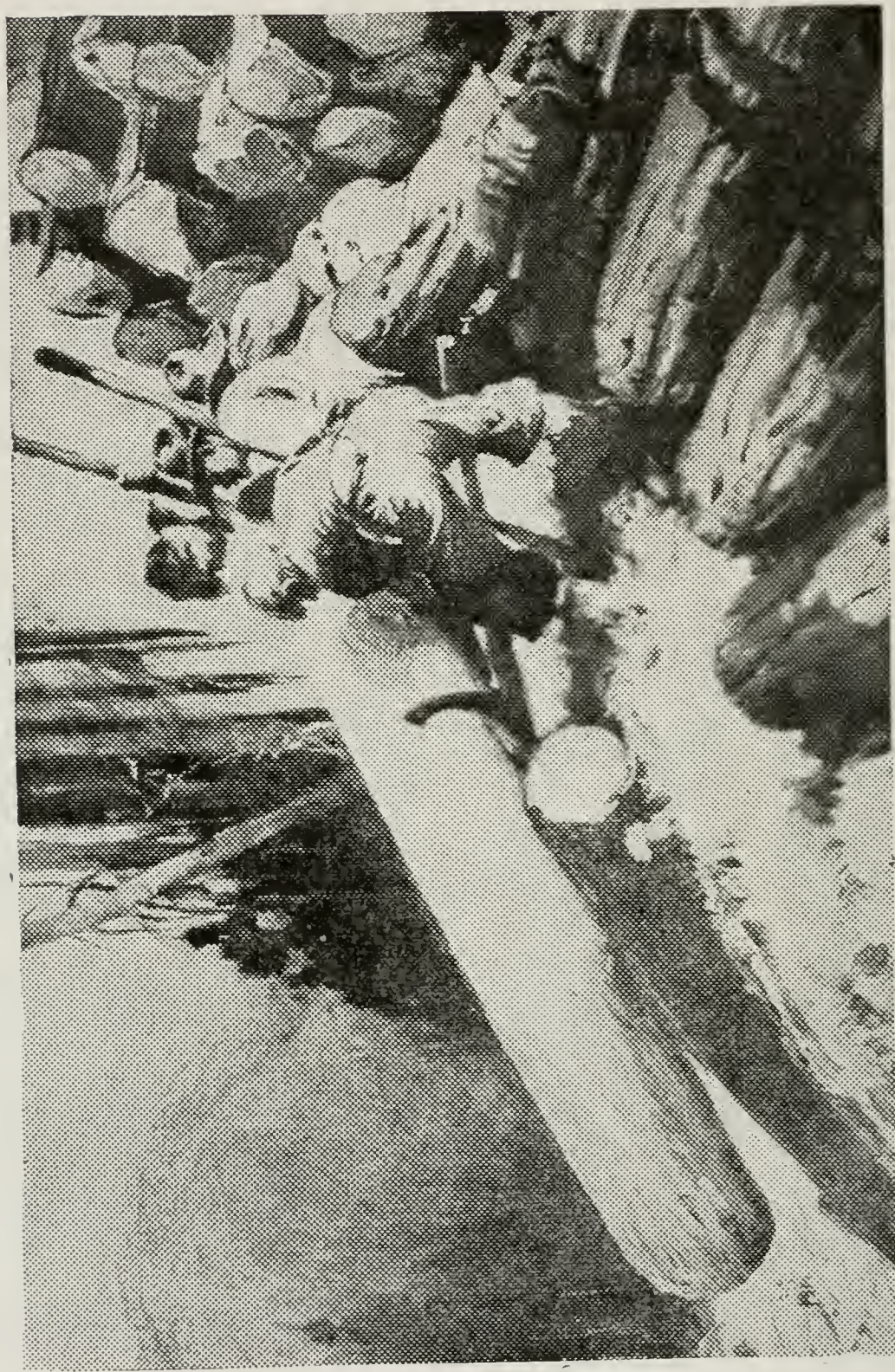
ESTIMATED CLASSIFICATION OF MONTANA LIVESTOCK AS OF JANUARY 1, 1870 TO 1933.

Year	Milk Cattle	Other Cattle	All Cattle	Horses	Sheep	Swine	Mules
1870.....	12,400†	24,000†	36,400	5,300†	2,000†	2,600†	500†
1880.....	11,500†	162,000†	173,500	36,000†	185,000†	10,500†	900†
1883.....	14,000	590,000	604,000	39,900	405,000	17,000	900
1884.....	14,200	672,000	686,800	45,900	466,000	17,500	1,000
1885.....	23,000	615,000	638,000	105,000	625,000	19,000	2,800
1886.....	25,300	725,700	751,000	120,700	719,000	19,000	8,900
1887.....	29,000	812,800	841,800	129,000	755,000	20,000	9,200
1888.....	31,000	934,500	965,500	187,000	1,265,000	22,000	5,500
1889.....	31,400	962,500	993,900	200,000	1,391,000	23,000	5,300
1890.....	33,000	981,800	1,014,800	216,000	1,990,000	29,000	2,400
1891.....	34,000	932,700	966,700	152,000	2,089,000	35,000	1,800
1892.....	35,700	1,026,000	1,061,700	197,000	2,089,000	35,000	1,200
1893.....	36,400	1,036,000	1,072,400	207,000	2,528,000	39,000	1,200
1894.....	36,400	1,057,000	1,093,400	197,000	2,781,000	39,000	900
1895.....	39,000	1,078,000	1,117,000	198,000	2,809,000	46,000	900
1896.....	42,000	1,154,000	1,196,000	183,000	3,061,000	52,000	900
1897.....	43,000	1,177,000	1,220,000	175,000	3,123,000	51,000	900
1898.....	42,700	1,082,000	1,124,000	171,000	3,248,000	47,000	900
1899.....	44,000	953,000	997,000	165,000	3,378,000	42,300	1,000
1900.....	48,500†	926,500†	975,000†	347,000†	6,170,000†	50,000†	2,800†
1901.....	49,400	960,200	1,009,600	302,000	6,417,000	47,000	3,400
1902.....	50,000	998,000	1,048,000	275,000	5,081,000	49,000	3,400
1903.....	52,400	1,048,600	1,101,000	246,600	5,120,000	51,700	3,400
1904.....	53,900	1,059,000	1,112,900	244,000	5,270,000	54,800	3,400
1905.....	55,000	1,048,000	1,103,000	236,800	5,639,000	57,600	3,400
1906.....	61,600	965,000	1,026,600	239,000	5,752,000	59,900	3,600
1907.....	66,000	916,300	982,300	292,000	5,637,000	62,900	4,000
1908.....	69,000	879,000	948,000	292,000	5,524,000	66,000	4,000
1909.....	75,000	905,000	980,000	304,000	5,634,000	68,000	5,000
1910.....	80,000	842,000	922,000	319,000	5,747,000	75,000	5,000
1911.....	80,000*	818,000*	898,000	344,000	5,230,000*	124,000	4,500*
1912.....	91,000	732,000	823,000	350,000*	4,926,000*	145,000	5,000*
1913.....	95,000	750,000*	845,000	385,000*	4,675,000*	168,000*	5,500*
1914.....	104,000	826,000*	930,000	440,000*	3,850,000*	187,000*	6,000*
1915.....	114,000	836,000	950,000	485,000*	3,340,000*	245,000*	6,500*
1916.....	125,000*	1,035,000*	1,170,000	520,000*	3,020,000*	270,000*	7,000*
1917.....	140,000*	1,114,000*	1,254,000	580,000*	2,670,000*	260,000*	7,500*
1918.....	150,000*	1,310,000*	1,460,000	640,000*	2,380,000*	202,000*	8,500*
1919.....	163,000*	1,447,000*	1,610,000	720,000*	2,530,000*	180,000*	9,000*
1920.....	178,000	1,192,000	1,370,000	669,000	2,450,000	167,000	9,000
1921.....	181,000	1,088,000	1,269,000	669,000	2,328,000	160,000	9,000
1922.....	185,000	1,195,000	1,380,000	650,000	2,561,000	180,000	10,000
1923.....	192,000	1,168,000	1,360,000	643,000	2,408,000	225,000	10,000
1924.....	209,000	1,151,000	1,360,000	611,000	2,480,000	292,000	11,000
1925.....	223,000	1,117,000	1,340,000	596,000	2,579,000	280,000	11,000
1926.....	225,000	1,055,000	1,280,000	576,000	2,880,000	250,000	11,000
1927.....	217,000	897,000	1,114,000	547,000	3,053,000	240,000	11,000
1928.....	212,000	902,000	1,114,000	531,000	3,358,000	288,000	11,000
1929.....	186,000	966,000	1,152,000	515,000	3,727,000	328,000	11,000
1930.....	188,000	976,000	1,164,000	469,000	4,200,000	302,000	11,000
1931.....	193,000	1,070,000	1,263,000	430,000	4,244,000	280,000	9,000
1932.....	195,000	1,081,000	1,276,000	400,000	3,820,000	252,000	8,000
1933.....	195,000	1,183,000	1,378,000	380,000	4,049,000	227,000	8,000

NOTE: Many earlier estimates were made to exact figures. In above table figures have been rounded to even thousands or even hundreds.

†Based upon census data.

*Tentative revisions. All other figures are U. S. Department of Agriculture estimates.



SHUNTING LOGS INTO STREAMS BEFORE THE SPRING FRESHETS

TIMBER RESOURCES OF STATE

*Over 20,000,000 Acres of Forest Land Bear Immense Quantities
of Commercial Timber—Forests Are Protected by
Federal and State Governments*

FORESTS form one of Montana's greatest natural resources. More than 20,000,000 acres of the state's 94,000,000 acres are classified as forest land. Timber of commercial size and quality is found on over 8,000,000 acres; more than 7,000,000 acres are cut-over, burned or young growth, and almost 5,000,000 acres are classified as protection or scrub forests situated either on the poorer sites at lower elevations or inaccessible at the higher altitudes.

Lumber ranks high in total value of finished products among manufacturing industries of Montana and second in number of persons employed, normally employing 6,000 of the state's population.

Forests play an important part in the industrial life and general welfare of the people. Many communities of the state are almost entirely dependent upon the lumber industry for prosperity.

Forests have a marked influence on the equalizing of stream-flow, tending to prevent floods and erosion, and are, therefore, of direct benefit in both irrigation and water-power development, as most of the great streams of the state rise in the mountains. They are a home for fish, game and fur-bearing animals and form an important source of recreation for an ever-increasing number of people.

An Immense Timber Reserve

Of Montana's total stand approximately 50,000 million board feet merchantable timber, about 75 per cent, or 37,492 million board feet, is found in nine western counties of the state. Of the total stand about 20 per cent is western yellow pine, about 40 per cent western larch and Douglas fir, the remainder largely lodgepole pine, Idaho white pine, cedar, hemlock, white and alpine fir, and spruce. About 27 per cent of all timber in the state is controlled by private individuals or companies, about four per cent is owned by the state, and the balance is in different federal holdings. Of timber privately owned, about 40 per cent is at present accessible, about 30 per cent indefinitely inaccessible, and of timber publicly owned less than 20 per cent could be profitably logged at this time, and about 50 per cent will remain indefinitely inaccessible.

The average annual lumber cut in Montana is about 341,555,000 board feet; the total of all forest products, including mine timbers, ties, poles and miscellaneous material averages about 480,240,000 board feet. Statistics show that during the 21-year period of 1904 to 1914 approximately 6,610,925 thousand feet of lumber were produced in Montana, production increasing from 12,571 thousand feet in 1870 to 351,403 thousand feet in 1914. Fifty-five per cent of the lumber cut and 64 per cent of all forest products came from private holdings, the rest being divided between state forests, national forests and other federal lands, mainly Indian reservations. The value of the 1929 cut, according to the 1930 census, including value added by manufacturing, was \$11,554,627. Not only the greater part of the \$3,409,182, original value of the timber, remains within the state, but also most of the \$8,038,799 added by manufacturing, and representing money spent for labor, equipment, taxes, logs, stumpage and profit, remains to add to the state's general prosperity.

Sawmill Operations

The census showed that there were within the state 86 active mills, and although the total average annual cut is about 350 million feet, the maximum annual capacity of Montana sawmills, on the basis of an eight-hour shift, is reported to be over 500 million feet, the 1932 cut being about 30 per cent of normal. Lumbering industries represent a capital value of \$50,000,000, about \$25,000,000 being invested in manufacturing plants, and lumber yards and an equal amount invested in private timber lands and stumpage. These industries contribute almost three-quarters of a million dollars annually through city, county and state taxes, and employ about 4,000 men, the annual payroll amounting to about \$5,500,000.

The state's total annual consumption of all forest products averages about 386,445,000 feet; over 85 per cent of which, or 331,970,000 feet, is produced within the state; about 13 per cent, or 54,475,000 feet imported from Washington and Idaho, and about 2,240,000 feet, mainly hard woods, imported from the southern and lake states. Annual consumption of mine timbers alone amounts to approximately 89,000,000 feet, Butte, the largest copper mining city of the world, being the chief consumer. Fifty-seven per cent of lumber produced, excluding sawed ties and mine timbers is exported. Total exports for all forest products amounts to approximately 84,950,000 feet annually. Lumber forms one of the very large factors in the freight transportation business of the railroads, amounting to over \$5,000,000 annually, and balancing a considerable portion of the state's bills for goods imported.

Montana State Forests

Montana owns more than a half million acres of state forest lands. They are comprised in seven state forests and many isolated state forest sections scattered throughout the state.

Stillwater State Forest.....	90,000 acres
Swan River State Forest.....	40,000 acres
Coal Creek State Forest.....	20,000 acres
Sula State Forest.....	10,000 acres
Thompson River State Forest.....	16,000 acres
Clearwater State Forest.....	19,000 acres
Lincoln State Forest.....	8,245 acres
Total of Established State Forests.....	203,245 acres
Forest Sections Scattered Throughout State.....	306,755 acres
	510,000 acres

While state forest lands cannot be sold, products of forests, consisting chiefly of timber and forage, are for sale. In 1932 timber land grazing leases were issued to 240 lessees covering over 150,000 acres. In addition, there are about 100 existing leases for summer home sites, fur farms, and miscellaneous use. The sale of state timber, normally about 30,000,000 feet annually, was reduced in 1932 to approximately 12,000,000 feet, or about 40 per cent of normal. The free permits for dry wood increased during 1931 and 1932 by about 500 per cent.

The normal annual timber cut from state forests furnishes employment for the entire year to at least 300 laborers and contributes over \$500,000 a year to the industrial wealth of the state. Receipts from stumpage on sales of timber that go to educational institutions of the state amount to approximately \$100,000 annually. Timber sale receipts from state forests, which have gone largely to the support of educational institutions, have aggregated over \$1,500,000 in the period from 1891 to 1932.

National Forests Within State

Within the state are 13 national forests created under acts of Congress authorizing the withdrawal of public lands for the protection of stream-flow and the production of timber. The national forests of Montana and northern Idaho constitute District No. 1 which is under the supervision of the district forester with headquarters at Missoula. Each forest is in charge of a supervisor located wherever most convenient for the administration of his forest. The forest itself is then sub-divided into districts, each district in charge of a forest ranger who handles timber sales, fire protection, grazing and similar work.

Of the total area of 18,889,615 acres of land within the national forest belt approximately one-third bears timber of commercial size and quality; one-third is of young growth, cut-over, or burned lands; one-sixth bears protection or scrub growth, and one-sixth is barren or mountain grass land. The forests are situated almost entirely in the mountainous, or western and southern portions of the state with the exception of the Custer forest located on the elevated mesas and buttes of southeastern Montana and extending from the Tongue river eastward into South Dakota.

The protection of the forests from fire and the control of fires constitute the ranger's most important work. The control of fires is sometimes difficult especially in the extreme western part of the state where the forests are dense, underbrush heavy, seasons sometimes very dry, humidity low, resulting in extremely dry, highly inflammable material on the forest floors, where lightning storms, accompanied by little or no rain, are frequent, and fires occasionally get beyond control.

So that the forest capacity may not be reduced, cutting of timber on national forests is limited to growth replacement and is restricted to mature timber or to thinnings that will result in increased growth or improvement of the stands. Timber is sold commercially to the highest bidder. Each tree is marked for cutting by the forest officer, and the logs scaled or pieces counted so that the purchaser pays for the exact amount of timber he receives. Sales are made to ranchers for their own use at cost of administration.

Vast Grazing Reservations

Although grazing of stock is not one of the original purposes for which national forests were created it has become one of the most important uses of the forests. All stock is grazed under permit with the exception of a few head of work horses and milk cows grazed free by actual settlers.

Division of the range between sheep and cattle generally depends upon the character of the range and the needs of the owners, preference being given to prior users and to persons owning and residing on improved ranch property in or near the forests and dependent upon the forests for range. Sheep are grazed in bands and each permittee allotted a definite range within which he may handle his stock. It is customary for cattlemen to cooperate in grazing and management of their stock, cattle usually being allowed to graze at will within certain limits and controlled by natural boundaries or drift fences, by salting and systematic riding of the range. Strong efforts are made to prevent over-grazing, which is the cause of not only reduction in grazing capacity but often of destructive erosion.

Where a forest area is burnt over but once, artificial reforestation is seldom necessary, as a single burn is not ordinarily sufficient to destroy all seed and the land will reseed naturally. But where a second burn occurs before the young trees are old enough to bear seed and where the area burnt is so great that seed will not be scattered from surrounding forests, reforestation through artificial means becomes necessary. Methods of direct seeding have been found impractical. The transplanting, of young trees, about three years old, from nurseries into the forests has been successful, results showing a survival of from 70 to 90 per cent of the transplants. The largest Forest Service nursery in the United States is the Savanac nursery, at Haugan, Montana, which produces about 3,000,000 transplants annually, sufficient to plant about 4,000 acres, and supplies the national forests of Idaho as well as Montana.

HONEY PRODUCTION OF STATE

BECAUSE of its favorable climatic conditions—cool nights and long, bright summer days—Montana produces a high quality, white honey. Aside from domestic table demands this honey is especially desirable for bottling purposes in the large consuming centers and for blending with the darker honeys from other sections thereby raising the flavor, quality and color of the lower grade honeys and making them more saleable.

Beekeeping and honey production is rapidly increasing in popularity in Montana and the output of honey in 1932 showed an increase of approximately 450 per cent over that for 1920. The state's production of marketable honey in 1920 was approximately 21 carloads, in 1930 it increased to about 100 carloads with a value of \$175,000 and in 1932 it had gone up to 116 carloads.

At the opening of 1933 bees were maintained on approximately 1500 Montana farms with individual holdings ranging from 10 to 1200 colonies to the farm. These holdings aggregated between 28,000 and 30,000 colonies, and the industry represented an investment of about \$1,000,000.

Production Average is Exceptionally High

Montana's average annual production has never been less than 100 pounds per colony, while the United States average, as given out by the U. S. Department of Agriculture, is but 43 pounds.

Beekeepers from other states where crop averages are lower are constantly looking to Montana for locations for their operations. During the years 1928-1932 many beekeepers moved into Montana from California, Oregon, Washington and Idaho.

The alfalfa and sweet clover growing abundantly in the irrigated valleys of Montana form the major sources of the honey produced in the state in which the principal producing sections are in Gallatin, Big Horn, Carbon, Yellowstone, Cascade, Valley, Blaine, Lake, Madison, Ravalli, Richland and Sweet Grass counties.

Alfalfa and clover seed producers desire the close proximity of beekeepers as their bees aid greatly in the cross-pollination necessary for the development of seed. In Ravalli and Lake counties bees are a decided factor in the cross-pollination of fruit trees and bushes.

Montana's principal honey markets are the large consuming centers of the east and west and in the past, considerable of its honey has gone into the export trade, mainly to England, Germany and France.

MONTANA STATE ELECTIVE OFFICERS

Governor.....	Frank H. Cooney
Lieutenant Governor.....	Office Vacant
Secretary of State.....	Sam W. Mitchell
Attorney General.....	Raymond T. Nagle
Treasurer.....	James J. Brett
Auditor, Insurance and Investment Commissioner...	John J. Holmes
Superintendent of Public Instruction.....	Elizabeth Ireland
SUPREME COURT OF MONTANA.....	{ Lew L. Callaway, Chief Justice J. A. Matthews, Associate Justice A. H. Angstman, Associate Justice S. V. Stewart, Associate Justice Ralph J. Anderson, Associate Justice
Clerk of Supreme Court.....	J. Ward Crosby

MODERN TRANSPORTATION METHODS

*State Crossed by Three Transcontinental Railroads—More Than
5,000 Miles of Operated Rail Lines
Excellent Air Service*

MONTANA, with more than 5,200 miles of railroad lines under operation, with trunk highways crossing the state from east to west and south to north, carrying hundreds of thousands of automobiles and trucks yearly, and with mail and passenger air lines bringing the principal cities into close contact with the commercial and industrial centers of the nation, has made remarkable progress in transportation since early territorial days less than 70 years ago, when entire dependence was placed upon Missouri river boats, stage coaches and wagon trains.

Today the river service is no more, and stage lines and animal-drawn outfits are but memories while the traveler moves about upon luxurious passenger trains, fast motor vehicles or time-eradicating air planes.

Crossing the state are three transcontinental railroads, with branches of two others entering the state, while three air lines furnish regular daily services in the transporting of mail, passengers and express between most of the larger cities of the state and those of other states enjoying like advantages.

Passenger and Mail Airlines

Commercial aviation in Montana had its inception on August 1, 1928, on which date National Parks Airways planes inaugurated scheduled flying between Great Falls and Salt Lake City. Air mail, passenger and express service was offered the people of Montana for the first time. Although stops were made only at Great Falls, Helena and Butte in the state, the service proved itself of benefit to many off-line communities through a combination of rail-air. Prior to the advent of the U. S. air mail, aviation activity was centered in a few localities where air taxi service, exhibition flying and instruction were carried on. Airports were found in some of the larger cities only. However, the past few years have seen the spread of air interest to all parts of the state and there are but few small villages which do not possess some kind of an airport. Transcontinental air trips are made frequently and all parts of the United States are now in direct touch with Montana for passenger and express service, as well as air mail, through connections at Salt Lake City, Cheyenne, Denver and the Twin Cities.

The art of flying has made tremendous progress during these past few years. The schedules flown by National Parks Airways have been doubled and it is now flying nine ships instead of the four with which service was started. These consist of five Fokker Super-Universals, two Boeing 40-B-4 planes and two Stearman mail planes. These ships are now equipped with two-way radio and the most modern of flying instruments. The route from Spencer, Idaho to Salt Lake City is lighted and equipped with directive radio beam. Government emergency fields dot the line from one end to the other. Weather reporting service is maintained at a high point of efficiency.



Courtesy Northern Pacific Ry

A TROUT STREAM IN A WESTERN MONTANA FOREST

Direct air service between eastern Montana points with the Twin Cities and Chicago was inaugurated March 2, 1933, by the Northwest Airways, Inc., with the extension from Bismarck, N. D., to Billings, Mont., of its western flight schedule. Daily service is provided by planes operating through to St. Paul, leaving Billings in the forenoon and arriving at that port from the east in the afternoon, furnishing service for that point and for Glendive and Miles City.

Six-passeger, Hamilton super-powered, all metal cabin monoplanes, carry passengers, mail and express between Billings and St. Paul, connecting at St. Paul with tri-motor planes for Chicago. All planes are equipped with two-way radio permitting constant communication with ground stations.

The Montana-Wyoming Air Lines provide daily passenger and express service between Billings and Denver, Colo., with stops at principal intermediate points and making connections at Denver and Cheyenne with trunk lines extending to the west, east and south. Stinson Junior four-place planes are utilized.

Motor Bus and Truck Lines

Sixty-four motor bus or motor freight licensees were covering 4,159 miles of Montana highways at the close of the fiscal year ending October 31, 1932, under permits from the Montana Railroad Commission. Of these, nine licensees with 26 vehicles were carrying passengers only, over 395 miles of routes, 22 licensees with 75 vehicles were carrying both passengers and express over routes aggregating 1,985 miles, and 33 licensees with 49 trucks were regularly transporting freight over routes totaling 1,779 miles.

Railroad Transportation

Montana's first rail line, a narrow gauge road, was built into the state from Salt Lake City in 1880. This road, the Utah & Northern, absorbed much of the business which had been coming across the plains by wagon trains and up the Missouri by boat. The Utah & Northern was not long alone in the field as in 1882 and 1883 the Northern Pacific built into the state from the east and this was followed a few years later by the Great Northern. In 1894, the Burlington entered from the southeast, and in 1906 and 1907, the Milwaukee built its line across the state. Now the state is well served by these principal railroads which have constructed branches into all the heavy tonnage producing sections and others have been reached by smaller independent lines.

Railroad Car Loadings in the State

During the 14 years, 1919 to 1932 inclusive, railroad car loadings in Montana totaled 4,173,513, or an average of 298,108 cars per year. In the year 1929, the last normal year preceding the world depression, 367,739 cars were loaded with freight in Montana for both interstate and intrastate movement.

Of these, minerals and products of the mines, quarries and oil fields led with an aggregate of approximately 170,000 cars, actual loadings of the various commodities in this classification being as follows:

Coal, commercial, 24,665; railroad coal, 50,128; ore, 53,323; concentrates, 6,181; refined copper, 6,121; slag and tailings, 3,844.

Other minerals and products—cement and plaster, 3,738; sand and gravel, 5,588; lime, 163; lime rock, 2,721; crushed rock, 218; stone, 567; brick and clay products, 1,266; petroleum, crude, 6,010; petroleum, refined, 5,277.

Next in importance agriculture and the livestock industry, with their raw materials or processed products, accounted for the loading of nearly 96,000 cars classified as follows:

Wheat 45,796, hay 2,745, flax 900, oats 615, rye 307, barley 231, corn 14, straw 27.

Cattle 12,746, sheep and goats 6,609, horses and mules 3,384, hogs 2,089, wool 724.

Flour and mill stuffs 9,353, butter 242, canned goods 288.

Dried peas and beans 1,389, potatoes 762, apples 509, fruits and vegetables 166.

Sugar, refined, 1,538, sugar beets, 5,227.

Movement of products of the forest required more than 43,000 cars, the loadings being as follows: lumber and its products 15,397, logs 21,177, poles, posts and piling 5,289, cord and slab wood 1,219.

Other classes of freight—emigrant movables and household goods 461, farm implements 358, furniture and fixtures 70, scrap iron and tin 500, railroad company freight 40.465, miscellaneous 17.332.

Extent of the main and branch lines of the several railroad systems as they were being operated in 1933, routes generally followed by these lines and cities and sections of the state served by them are set forth in the following paragraphs.

Northern Pacific Railway

The Northern Pacific, with its eastern terminus in St. Paul and its western terminus on Puget Sound, was the pioneer of the transcontinental lines built across Montana. Construction within the state was started in the early eighties and completed in 1883. Its last construction work consisted of the building of a branch from Glendive to Circle and Brockway in 1928 and the relocation of the Bitter Root valley branch in western Montana the same year.

The main line enters the state near Beach, N. D., and runs westerly through Wibaux to Glendive and then follows up the Yellowstone river through the principal towns of Terry, Miles City, Forsyth, Hysham, Billings, Laurel, Columbus, and Big Timber to Livingston and then over a divide to Bozeman and to Logan where the line branches, the northern section passing down the Missouri river through Townsend to Helena and then over the Continental divide to Garrison, while the southern line passes through Three Forks and Whitehall, over the Continental divide and into Butte and then on through Deer Lodge to Garrison where the two lines rejoin. From here in a general northwesterly direction the line passes through Drummond, Missoula and Thompson Falls into Northern Idaho.

From Glendive, in eastern Montana, a branch runs northeasterly down the Yellowstone river to Sidney, with other branches in the order in which they take off from the main line from east to west as follows:

From Nichols a line running south to Colstrip in the Rosebud coal field; from Billings an agricultural branch extending through an irrigated section to Shepherd; from Laurel a line running southwestward into the farming and coal mining sections of Bridger and Red Lodge and a northwesterly branch through a wheat growing country to Rapelje; a feeder line from Livingston north up the Shields river valley to Wilsall and a southerly line up the Yellowstone river to Gardiner at the northern entrance to Yellowstone National Park.

From Manhattan south a feeder line through the Gallatin valley to Anceny; from Sappington a south branch to Pony and Norris; from Whitehall a south line up the Jefferson and Ruby valleys to Alder, near the historic old mining town of Virginia City; south from Drummond a line to the mining town of Philipsburg; from Missoula a line running south up the rich Bitter Root valley to Darby, and from Dixon a line running north through the Flathead valley and the old Flathead Indian reservation to Polson at the foot of Flathead lake. A short distance west of Missoula a line branches off and extends northwesterly through the western part of the state to the mining center of Wallace, Idaho.

The Northern Pacific in Montana operates 976.54 miles of main line and 599.03 miles of branches and spurs, together with 52.27 miles under lease and 5.37 miles under trackage rights, a total of 1633.21 miles. Its total trackage in the state, including main line double tracks, is 2418.79 miles. For taxation purposes the property of the company in Montana was assessed in 1932 at \$72,536,345.

Great Northern Railroad

The Great Northern, the most northerly of the transcontinentals and the second to enter Montana, was built through the state during the latter eighties and extends westward from St. Paul to the Puget Sound cities.

Its main line enters northeastern Montana near the confluence of the Missouri and Yellowstone rivers and proceeds westerly across the northern part of the state through the principal towns of Culbertson, Poplar, Wolf Point, Glasgow, Malta, Chinook, Havre, Chester, Shelby, Cut Bank, Glacier Park, Columbia Falls, Whitefish, Eureka, Libby and Troy and on into northern Idaho.

Upon entering Montana the line traverses the Missouri and Milk river valleys half way across the state, then through a prairie country to the Rocky mountains, skirts the south border of Glacier National Park, crosses the Continental divide and follows the Kootenai river into the panhandle of Idaho.

From Havre, where it connects with the main line, a sub-main line extends southwesterly through Great Falls and Helena to Butte, while from Billings, where it interchanges with the Burlington and Northern Pacific systems, another sub-main line extends northwesterly through Great Falls and Shelby, connecting with the main line at the latter point, and on to the Canadian border where its rails join those of the Lethbridge branch of the Canadian Pacific.

From this Billings-Great Falls line a branch extends to Lewistown in the heart of the Judith basin, while out of Great Falls are four branches, one to the Neihart mining district, one to the coal camps of Sand Coulee and Stockett, one up the Sun river valley to the stock raising country of Augusta, and one through the Bynum irrigation district to Pendroy.

From Brockton in eastern Montana a branch runs southwesterly through Fairview and Sidney to Richey, connecting with a Northern Pacific branch at Sidney, and one runs northwesterly from Bainville through Plentywood to Opheim near the Canadian border. From the Milk river country the Turner branch extends northwesterly from Saco to Hogeland, also near the Canadian line. This branch was the last of the Great Northern extensions, being built in 1928. Running south from Columbia Falls a branch extends to Kalispell and on to Somers at the head of Flathead lake, while from Rexford, in northwestern Montana, a branch runs north to the Fernie coal field in Canada.

The Great Northern has the largest Montana mileage of any railway system. It has 1302.85 miles of main line, 562.50 miles of branches and spurs, 22.56 miles operated under trackage rights, a total of 1887.91 miles. Its trackage, including double tracks, totals 2661.26 miles. For taxation purposes its Montana properties were assessed at \$80,068,225 in 1932.



ELECTRICALLY PROPELLED TRAIN ON MONTANA LINE

Chicago, Milwaukee, St. Paul & Pacific Railroad

The Milwaukee Road, operating between Chicago and Puget Sound points, was the last of the northern transcontinentals to build into Montana. Construction of its main line was started in 1906 and completed in 1908.

This railroad enters the state at Montline, just east of Baker, and runs west to Terry, thence westerly up the Yellowstone river through Miles City to Forsyth where it leaves the valley and further west at Melstone enters the Musselshell river valley and on up that stream through Roundup and Harlowton to the divide between the Castle and Crazy mountains, thence southwesterly through Three Forks and Whitehall and over the Continental divide into Butte. From Butte the line turns northwesterly and passes through Deer Lodge, Drummond, Missoula and Superior to the Idaho boundary. The entire 415 miles of main line from Harlowton, in central Montana, to Idaho is operated by electricity generated by hydro-electric plants within the state. The electrification of this stretch was completed in February, 1917.

From Harlowton a branch line extends northerly to Lewistown and westerly to Great Falls with three feeder lines out of Lewistown to Winnett, Roy and Winifred, and one out of Great Falls to Agawam.

From Three Forks, where the Madison, the Gallatin and the Jefferson rivers join to form the Missouri, a branch system traverses the rich Gallatin valley serving Bozeman with termini at Menard, Belgrade and Gallatin Gateway, the latter being the Milwaukee's entrance to Yellowstone National Park.

From Bonner, near Missoula, a branch lumber road runs northeasterly up the Blackfoot valley to Sunset.

The Milwaukee has 947.33 miles of main line in Montana, with 294.61 miles of branches and spurs, a total of 1241.94 miles. Its complete trackage aggregates 1579.50 miles. For purposes of taxation the property of the system within Montana was assessed in 1932 at \$47,460,463.

Chicago, Burlington & Quincy Railroad

The southeastern part of Montana is served by two lines of the Burlington system coming in from Wyoming. One of these, the extension of the main line from Omaha through Alliance, Neb., and Sheridan, Wyo., enters the state at Aberdeen and runs northwesterly 102 miles through Hardin, past the Custer battlefield to Huntley, from where entrance into Billings is gained over Northern Pacific trackage. This line was built in 1894. In 1922 a branch was built northerly from Hardin down the Big Horn valley to Foster to facilitate the handling of the sugar beet crops of northern Big Horn county.

In 1911 the Cody-Denver line was extended northward into the state, entering Montana just north of Frannie, Wyo., and running northerly to Fromberg from where Northern Pacific trackage is utilized into Billings. This line furnishes an entrance to Yellowstone National Park via Cody.

The Burlington operates in Montana 134.38 miles of its own main line with 18.09 miles of spurs and 49.45 miles operated under trackage rights, a total of 201.92 miles.

For taxation purposes the property of the railroad in Montana was assessed at \$6,279,894 in 1932

Oregon Short Line

The Oregon Short Line, a part of the Union Pacific system, serves Montana by a line extending northward from Salt Lake city through southwestern Montana into Butte. This, the pioneer rail line into Montana, was originally a narrow gauge road built by the Utah & Northern in 1880. It was extended into Butte in 1881, was converted into a standard gauge line in 1888 and the following year the property was consolidated with the Oregon Short Line.

The road enters the state from Idaho at Monida and runs northerly down the Red Rock and Beaverhead rivers to Dillon, thence over a divide and up the Big Hole river as far as Divide and on north to Butte.

In recent years a branch of this line was built from St. Anthony, Idaho, to the western entrance to Yellowstone National Park, of which but four miles are in Montana.

The Oregon Short Line operates 125.75 miles of main line in Montana, with 9.53 miles of branches and spurs and 7.05 miles under trackage rights, a total of 142.33 miles. The company also owns 52.27 miles of main line between Butte and Garrison which is operated by the Northern Pacific under lease. For taxation purposes the property of the company in Montana was assessed at \$5,561,192 in 1932.

Butte, Anaconda & Pacific Railway

The Butte, Anaconda & Pacific Railway company is a subsidiary of the Anaconda Copper Mining company and was organized primarily to provide for the transportation of ores and refined minerals between the Butte mines and the Washoe reduction works at Anaconda.

The road's equipment is operated by electricity and its trackage lies wholly in and about Butte and Anaconda and between those points, with an additional nine-mile stretch of line between Anaconda and Stuart under lease from the Northern Pacific Railway. Its operated mileage consists of 25.29 miles of main line, 33.97 miles of branches and spurs, and 8.94 miles of branch line operated under lease, a total of 68.20 miles. For taxation purposes the property of the railroad in 1932 was assessed at \$3,397,454.

Minneapolis, St. Paul & Sault St. Marie Railway

This railroad, generally known as the Soo Line, is represented in Montana by an extension of a branch of the trunk line running in a northwesterly direction from Fairmount, N. D., into Canada.

This branch enters the northeast corner of the state at Westby and runs in a westerly direction paralleling and from six to ten miles south of the Canadian boundary line, through Sheridan county to Whitetail in Daniels county. Only 56.88 miles of Soo Line trackage is located in Montana. For taxation purposes the property of the railroad in Montana was assessed in 1932 at \$582,752.

Montana, Wyoming & Southern Railroad

The Montana, Wyoming & Southern Railroad is an independent line wholly within Carbon county and serving several of the coal camps in the vicinity of Red Lodge. Connecting at its northern terminus in Bridger with a branch of the Northern Pacific its track runs southwesterly up the Clark Fork valley through a fine agricultural country to the coal mining towns of Belfry, Bear Creek and Washoe, with spurs to the mining camps of McCarthy, International and Berwind. It operates 23.15 miles of main line, 3.41 miles of branches and spurs and a half mile of leased trackage, a total of 27.06 miles.

Montana Western Railway

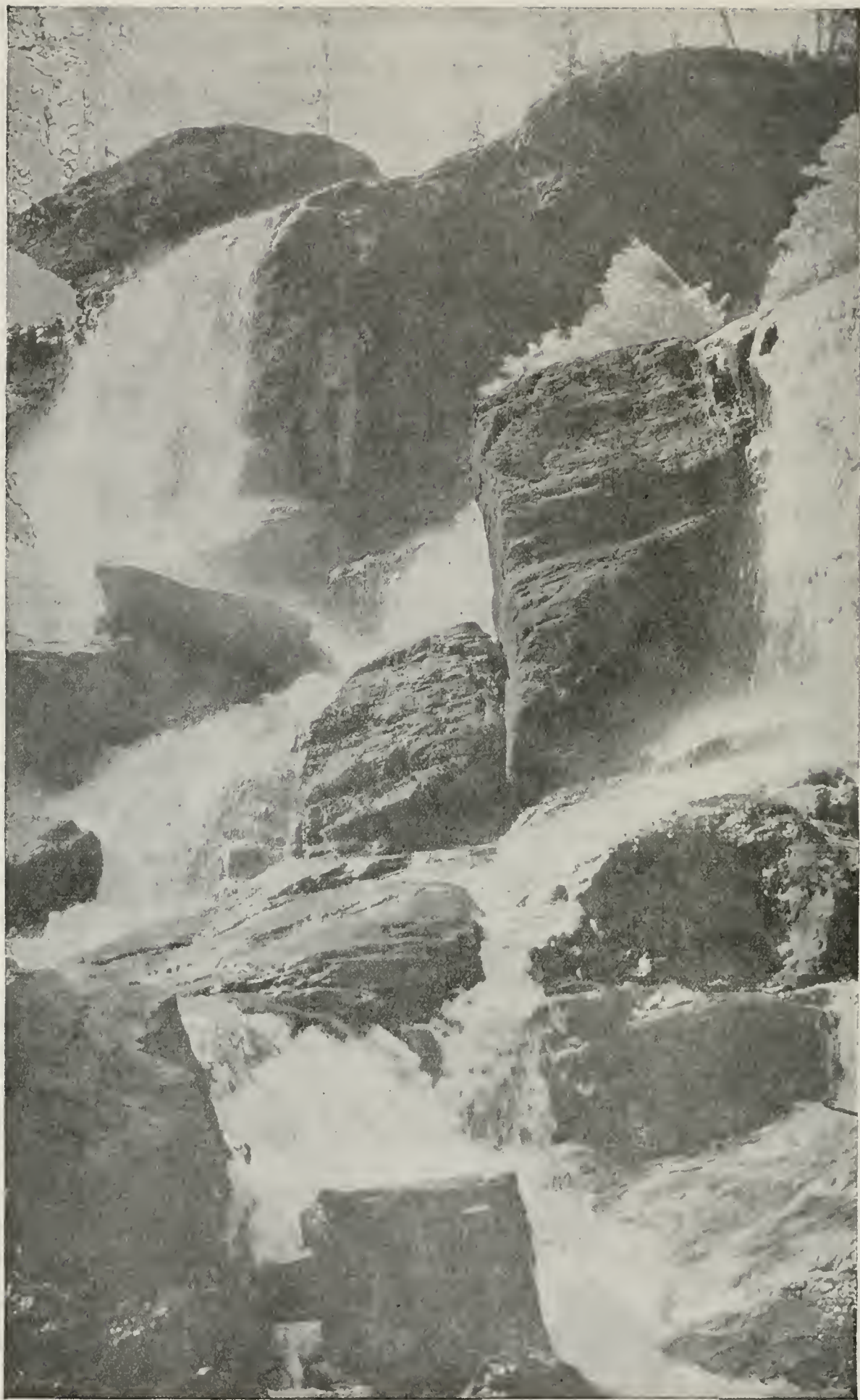
The Montana Western Railway lies wholly within Pondera county and extends northwesterly from Conrad through the heart of the Valier irrigation project to the town of Valier. It was built by the promoters of the Valier project to aid in the settlement and development of that large Carey land act undertaking. It connects at Conrad with the Shelby-Great Falls line of the Great Northern and utilizes trackage of that system for a distance of 3.33 miles out of the junction point. It operates 16.85 miles of main line, 2.32 miles of spurs and 3.33 miles under trackage rights, a total of 22.50 miles.

White Sulphur Springs & Yellowstone Park Railway

This is a short line serving as a rail outlet for the famous hot springs resort in Meagher county and operates in connection with the Milwaukee Road. It was built after the completion of the main transcontinental line of the Milwaukee with which it connects at Ringling. From Ringling the line runs northerly for the most part down the south fork of Smith river to White Sulphur Springs and furnishes the only rail service into that section of the state. Its operated trackage consists of 19.32 miles of main line, 2.03 miles of spurs, 4.11 miles of line under contract and 1.30 miles under trackage rights, a total of 26.76 miles.

Gilmore & Pittsburgh Railroad

The Gilmore & Pittsburgh is a small system built to serve the mining districts of the Lemhi valley in eastern Idaho. Its only rail connection is with the Oregon Short Line at Armstead in Beaverhead county, southwestern Montana. From its junction with the Oregon Short Line at Armstead its track runs westerly up Horse Prairie creek a distance of 37.7 miles to the Idaho line at the summit of the Beaverhead mountains and then down to Leadore, Idaho, where it ties into its north and south line from Gilmore down the Lemhi valley to Salmon City.



Courtesy Northern Pacific Ry.

CASCADES IN THE SWAN RIVER VALLEY

COUNTIES AND THEIR RESOURCES

State is Districted Into 56 Political Subdivisions—Many are Greater in Size than Some States—Only Three Are Without Railroads

MONTANA counties, which numbered but nine at the time of the creation of the Territory of Montana in 1864, now total 56. At the time of the creation of these original nine counties none was served by railroads, transportation being limited to river travel and uncharted wagon trails. Now rail lines directly serve all but three of the 56 counties and a federal-state system of improved highways connects all county seats.

In spite of the carving of the state into this number of political subdivisions it has six counties, each of which is larger in area than the State of Connecticut, 30 which are larger than Delaware, and 50 which are larger than Rhode Island.

Montana counties are divided by law into seven classes, based upon the taxable (not assessed) value of property within their borders. The number and salaries of county officials vary according to the classification of the county.

The assessed valuations of the several counties in 1932 ranged from \$4,944,886 to \$110,963,405, and the taxable valuation from \$1,711,734 to \$33,133,272. The classification of the counties, based on the 1932 tax assessments, follows:

- Class 1. Value in excess of \$50,000,000. None.
- Class 2. Value between \$30,000,000 and \$50,000,000: One—Cascade.
- Class 3. Value between \$20,000,000 and \$30,000,000: One—Silver Bow.
- Class 4. Value between \$15,000,000 and \$20,000,000: Two—Yellowstone and Lewis and Clark.
- Class 5. Value between \$10,000,000 and \$15,000,000: Five—Deer Lodge, Fergus, Flathead, Gallatin and Missoula.
- Class 6. Value between \$5,000,000 and \$10,000,000: Twenty — Beaverhead, Blaine, Carbon, Chouteau, Custer, Dawson, Hill, Judith Basin, Lincoln, Park, Pondera, Powell, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Teton, Toole and Valley.
- Class 7. Value less than \$5,000,000: Twenty-seven—Big Horn, Broadwater, Carter, Daniels, Fallon, Garfield, Glacier, Golden Valley, Granite, Jefferson, Lake, Liberty, Madison, McCone, Meagher, Mineral, Musselshell, Petroleum, Phillips, Powder River, Prairie, Ravalli, Stillwater, Sweet Grass, Treasure, Wheatland and Wibaux.

BEAVERHEAD COUNTY

Beaverhead county is located in southwestern Montana and is bounded on the west and south by Idaho. Area 5,619 square miles. Population 6,654. County seat Dillon. population 2,422, altitude 5,089. Dillon is the seat of the State Normal College.

Other principal towns of county are Wisdom, Armstead, Jackson and Dell.

Principal farm products—livestock, hay and oats, with wheat, barley and potatoes in lesser volume. Number of farms 581. The Big Hole basin is one of the richest beef fattening sections of country.

Industries—dairying, mining, lumbering, meat packing and flour milling. The county is traversed from north to south by the Oregon Short Line railroad.

Assessed value of county \$17,451,452. Average tax levy 56.033 mills. Average farm land tax per acre 9 cents. County indebtedness \$48,656.*

*Valuation, tax and debt figures for this and following counties are taken from the report of the State Board of Equalization and are for the 1932 tax year.

BIG HORN COUNTY

Big Horn county is located in southern Montana bordering on Wyoming. Area, 5,116 square miles. Population, 8,543. County seat, Hardin; population, 1,169; altitude, 2,966. County includes practically all of the Crow Indian reservation.

Other principal towns of county are Lodge Grass, Wyola, Crow Agency, Corinth and St. Xavier.

Principal farm products—livestock, sugar beets, wheat, oats, rye, barley, honey, hay and other forage crops. County has large area of irrigated land. Number of farms, 1,086.

Industries—coal mining and lumbering. County is traversed by Billings branch of the Chicago, Burlington & Quincy railroad.

Assessed value of county, \$13,270,662. Average tax levy, 64.968 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$379,624.

BLAINE COUNTY

Blaine county is located in north-central Montana, bordering on Canada. Area, 4,271 square miles. Population, 9,006. County seat, Chinook; population, 1,320; altitude, 2,400. Belknap Indian reservation is largely within south-eastern part of county.

Other principal towns of county are Harlem, Zurich, Lohman, Savoy, Coburg and Turner. Much of the land in the Milk River valley, which crosses county from east to west, is under irrigation and is highly productive.

Principal farm products—livestock, sugar beets, potatoes, wheat and other cereals flax and hay. Number of farms, 1,288.

Industries—sugar refining, coal mining, dairying. Main line of Great Northern railway crosses county.

Assessed value of county, \$16,593,956. Average tax levy, 64.628 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$237,730.

BROADWATER COUNTY

Broadwater county is situated in central Montana. Area, 1,250 square miles. Population, 2,738. County seat, Townsend; population, 735; altitude, 3,800. The county is bordered on the west by the Elkhorn range of the Rockies, and on the east by the Big Belt mountains. Much of the valley of the Missouri river, which flows through the county from south to north, is irrigated and highly developed.

Other principal towns of the county are Toston, Radersburg and Winston.

Principal farm products—livestock, sugar beets, cereal grains, potatoes and hay. Number of farms, 328.

Industries—mining and dairying. The original main line of the Northern Pacific railway crosses the county and the southern part is served by the main line of the Milwaukee railway.

Assessed valuation of county, \$9,635,381. Average tax levy, 54.133 mills. Average farm land tax per acre, 12 cents. County indebtedness, \$82,941.

CARBON COUNTY

Carbon county is in south-central Montana, bordering on Wyoming. Area, 2,069 square miles. Population, 12,571. County seat, Red Lodge; population, 3,026; altitude, 5,650. The Beartooth mountains, highest in the state, rear their peaks in the southwestern part of the county. Melting snows from these peaks furnish water for irrigating thousands of acres of rich lands in the valleys.

Other principal towns of the county are Bear Creek, Belfry, Bridger, Fromberg, Edgar, Silesia, Joliet, Boyd, Roberts, Luther and Roscoe.

Leading farm products—livestock, sugar beets, corn, wheat and other grains, vegetables, honey and hay. Number of farms, 1,170.

Industries—coal mining and vegetable canneries. The county is served by lines of the Northern Pacific, the Chicago, Burlington & Quincy, and the Montana-Wyoming & Southern railroads.

Assessed value of county, \$19,812,735. Average tax levy, 69.019 mills. Average farm land tax per acre, 21 cents. County indebtedness, \$441,320.

CARTER COUNTY

Carter county occupies the southeastern corner of Montana, bordering on South Dakota and Wyoming. As it is remote from transcontinental railroads and is served by no rail lines, the grazing of livestock is the predominant industry. Area, 3,319 square miles. Population, 4,136. County seat, Ekalaka; population, 475; altitude, 3,000.

Other towns are Pinele, Capitol, Albion, Boyes, Belltower, Ridge and Stoneville.

Principal products—livestock, wheat, corn and other grains; hay. Number of farms, 848.

Industries—dairying and lumbering to a limited degree.

Assessed value of county, \$8,495,903. Average tax levy, 65.134 mills. Average farm land tax per acre, 10 cents. County indebtedness, \$154,640.

CASCADE COUNTY

Cascade county is located in central Montana. Area, 2,722 square miles. Population, 41,146. County seat, Great Falls; population, 28,822; altitude, 3,300. Is second largest city in state. Has daily air mail service. Is leading banking and distributing center for north-central and northern Montana.

Other principal towns of county are Belt, Cascade, Stockett, Sand Coulee, Neihart, Monarch, Simms, Sun River, and Fort Shaw.

Principal farm products—livestock, wheat, sugar beets and forage crops. Number of farms, 1,404.

Industries—general manufacturing, flour mills, meat packing plants, copper and zinc refineries, oil refineries, iron works, hydro-electric power plants, railroads, coal and silver mining. County is served by Great Northern and Milwaukee railroad systems, and the National Parks Airways.

Assessed value of county, \$110,963,405. Average tax levy, 56.75 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$690,917.



CATTLE GRAZING ON SUMMER RANGE

CHOUTEAU COUNTY

Chouteau county, in north-central Montana, contains the first permanent settlement within the state. At the head of navigation on the Missouri river, it was the center of fur-trading operations of pre-territorial days. It is bordered on the south-east and northeast by the Highwood and Bears Paw mountains. Area, 3,942 square miles. Population, 8,635. County seat, Fort Benton, population, 1,109; altitude, 2,600.

Other principal towns are Big Sandy, Geraldine, Highwood, Square Butte, Carter, Loma and Montague.

Principal farm products—wheat and other grains, corn, hay and livestock. Number of farms, 1,587.

Transportation facilities are provided by lines of the Great Northern and Milwaukee railroads.

Assessed value of county, \$26,634,025. Average tax levy, 54.953 mills. Average farm land tax per acre, 12 cents. County indebtedness, \$506,874.

CUSTER COUNTY

Custer county, in eastern Montana, is one of the big livestock growing sections of the state, and contains the United States Livestock Experiment station of 57,000 acres. Area, 3,788 square miles. Population, 11,242. County seat, Miles City; population, 7,175; altitude, 2,371. Has daily air mail service. The Montana Industrial School for Boys is located here.

Other principal towns are Ismay, Kinsey, Beebe, Shirley, Ulmer and Calabar.

Principal farm products—livestock, hay, wheat and other grains; alfalfa seed, sugar beets and beans. Number of farms, 715.

Industries—dairying, meat packing and oil refining. County is crossed by main lines of Northern Pacific and Milwaukee railroads and is served by the Northwest Airways.

Assessed value of county, \$25,883,047. Average tax levy, 55.411 mills. Average per acre farm land tax, 7 cents. County indebtedness, \$141,228.

DANIELS COUNTY

Daniels county in northeastern Montana, bordering on Canada, is a prairie section highly productive of grain. Area, 1,440 square miles. Population, 5,553. County seat, Scobey; population, 1,259; altitude, 2,450.

Other principal towns are Whitetail, Flaxville, Peerless, Modoc, Navajo and Four Buttes.

Principal farm products are wheat, flax, rye, oats and barley. Number of farms, 906.

Industries—dairying and lignite coal mining.

The county is served by branch lines of the Great Northern and Soo railroads.

Assessed valuation of county, \$9,836,246. Average tax levy 88.523 mills. Average per acre farm land tax, 23 cents. County indebtedness, \$195,956.

DAWSON COUNTY

Dawson county is located in east-central Montana. Area, 2,383 square miles. Population, 9,881. County seat, Glendive, where are located shops of the Northern Pacific railway. Population of Glendive, 4,629; altitude, 2,071. Has daily air mail service.

Other principal towns of county are Richey, Lindsay, Bloomfield, Union, Intake and Stipek.

Principal farm products—livestock, sugar beets, wheat and other grains; hay, and corn. Number of farms, 1,018.

The county is crossed by the main line of the Northern Pacific and is served by a branch of that system, by a branch of the Great Northern railroad and by the Northwest Airways.

Assessed value of county, \$20,075,085. Average tax levy, 65.197 mills. Average per acre farm land tax, 12 cents. County indebtedness, \$522,074.

DEER LODGE COUNTY

Deer Lodge county is in west-central Montana. It is largely mountainous and aside from mining and smelting its industries are mainly those of stock raising, with some farming and gardening. Area, 730 square miles. Population, 16,293. County seat, Anaconda; population, 12,494; altitude, 5,288. Its farms number 142.

Its principal industry is its copper smelter at Anaconda, one of the largest in the world. This plant, in addition to its copper output, produces vast quantities of arsenic, sulphuric acid and phosphate. Other industries are mining and lumbering.

Within the county are located two state institutions, the hospital for the insane at Warm Springs, and the tuberculosis sanitarium at Galen.

The county is served by the main lines of the Milwaukee, Northern Pacific and the Butte, Anaconda & Pacific railroads.

Assessed value of county, \$33,099,301. Average tax levy, 44.382 mills. Average per acre farm land tax, 11 cents. County indebtedness, \$131,374.

FALLON COUNTY

Fallon county is in southeastern Montana bordering on North Dakota. Area, 1,673 square miles. Population, 4,568. County seat, Baker.; population, 1,212, altitude, 2,929. Other principal towns are Plevna, Ollie and Westmore.

It is largely a stock raising county, but produces large crops of corn, wheat, flax, oats, barley, rye, potatoes and hay. Its farms number 650.

Aside from agriculture, its industries consist mainly of natural gas and lignite production and some lumbering.

The county is served by the main line of the Milwaukee railroad and by a branch of the Northern Pacific.

Assessed value of county, \$13,587,107. Average tax levy, 58.937 mills. Average per acre farm land tax 15 cents. County indebtedness, \$342,271.

FERGUS COUNTY

Fergus county is geographically the central county of Montana. The Missouri river forms its northern boundary with mountain ranges to the south and west. Area, 4,312 square miles. Population, 16,531. County seat, Lewistown; population, 5,358; altitude, 3,960.

Other leading towns—Denton, Moore, Grass Range, Garneill, Straw, Buffalo, Hanover, Hilger, Roy, Kendall, Winifred and Teigen.

Principal farm products—livestock, wheat, oats, barley, rye and hay. Number of farms, 2,073.

Industries—oil refineries, cement and gypsum mills, flour mills, metal and coal mining.

The county is well served by numerous branches of the Great Northern and Milwaukee railroads.

Assessed value of county, \$34,576,530. Average tax levy, 74.382 mills. Average per acre farm land tax, 19 cents. County indebtedness, \$1,232,373.

FLATHEAD COUNTY

Flathead county is in northwestern Montana, bordered on the north by Canada, and on the east by the main range of the Rocky mountains. The Whitefish and Flathead ranges cross the county while within it are many large and beautiful lakes and a large portion of Glacier National Park. It is the leading vacation area of the state.

Area, 5,294 square miles. Population, 19,200. County seat, Kalispell; population, 6,094; altitude, 2,959. Other principal towns—Whitefish, Columbia Falls, Somers, Belton, Big Fork, Apgar, Coram, Creston, Essex, Kila, Lake Five, Marion, Lupfer, Mock, Nyack and Olney. The State Soldiers' Home is located near Columbia Falls.

Principal farm crops—livestock, grain, hay, potatoes, vegetables, apples and cherries. Number of farms, 1,349.

Industries—lumbering and lumber manufacturing, dairying, metal mining.

The county is served by the main and branch lines of the Great Northern railroad.

Assessed value of county, \$33,683,521. Average tax levy, 57.223 mills. Average per acre farm land tax, 21 cents. County indebtedness, \$516,449.

GALLATIN COUNTY

Gallatin county is in south-central Montana, bordering on the south upon Yellowstone National Park. The Gallatin valley is one of the richest agricultural sections of the state, largely irrigated and highly developed. The county is largely bounded on the east and west by the Gallatin, Madison and Bridger ranges of mountains. In its northern part the Gallatin, Madison and Jefferson rivers join to form the Missouri river.

Area, 2,532 square miles. Population, 16,124. County seat, Bozeman; population, 6,855; altitude, 4,771. At Bozeman is located the State College of Agriculture and Mechanic Arts, and the Agricultural Experiment station.

Other leading towns—Three Forks, Manhattan, Belgrade, Willow Creek, Trident and Gallatin Gateway.

Principal farm products—livestock, wheat, barley, oats, rye, seed and canning peas, alfalfa hay. Number of farms, 1,336.

Industries—cement plant, flour and cereal mills, pea cannery, metal and coal mining.

The county is served by the main and branch lines of the Northern Pacific and Milwaukee railroads.

Assessed value of county, \$40,481,981. Average tax levy, 48.023 mills. Average per acre farm land tax, 19 cents. County indebtedness, \$285,257.

GARFIELD COUNTY

Garfield county is an inland county in east-central Montana, untouched by rail lines. Because of lack of immediate transportation facilities the development of its agricultural possibilities have been retarded and more attention devoted to the raising of livestock. In spite of this handicap it produces large crops of wheat and other grains, corn and hay. Number of farms, 1,077.

Area, 4,858 square miles. Population, 4,252. County seat, Jordan; population, 813; altitude, 2,800. Other principal towns of county are Cohagen, Edwards, Sand Springs and Mosby.

The Missouri river forms the northern boundary of the county and Pine Buttes, a range of low mountains, are located in the northeastern part of the county.

Aside from some coal mining and some oil development, the industries of the county are practically confined to farming and stock raising.

Assessed value of county, \$12,537,210. Average tax levy, 53.333 mills. Average per acre farm land tax, 9 cents. County indebtedness, \$83,530.

GLACIER COUNTY

Glacier county is in north-central Montana, bordering on Canada. The main range of the Rocky mountains form its western border and a portion of Glacier National Park occupies its western quarter. The southern portion of the county is largely irrigated. The Blackfeet Indian reservation lies almost wholly within the county. The county's area is 3,045 square miles, and its population, 5,297.

County seat, Cut Bank; population, 845; altitude, 3,698. Other main towns are Glacier Park, Browning and Babb.

Principal farm products—livestock, wheat, and hay. Number of farms, 455.

Industries—oil and gas development, dairying, vacationing.

The county is crossed by the main line of the Great Northern railroad.

Assessed value of county, \$11,492,065. Average tax levy, 62.003 mills. Average per acre farm land tax, 14 cents. County indebtedness, \$128,907.

GOLDEN VALLEY COUNTY

Golden Valley county is in south-central Montana. It consists largely of rolling prairie land with the Snowy mountains in the northern portion. Area, 1,173 square miles. Population, 2,126. County seat, Ryegate; population, 292; altitude, 3,632. Other main towns—Lavina, Barber, Belmont and Franklin.

Principal farm products—livestock, wheat, oats, rye, barley and corn. Number of farms, 387.

Industries—dairying.

The county is crossed by the main line of the Milwaukee railroad and by a branch line of the Great Northern.

Assessed value of county, \$7,535,255. Average tax levy, 61.163 mills. Average per acre farm land tax, 10 cents. County indebtedness, \$335,172.

GRANITE COUNTY

Granite county is in west-central Montana, and is largely mountainous, being bounded on the south by the Continental divide. Area, 1,773 square miles. Population, 3,013. County seat, Philipsburg; population, 1,300; altitude, 5,175. Other principal towns are Drummond and Hall.

Principal farm products—livestock, oats, wheat, barley, flax and hay. Number of farms, 247.

Industries—metal mining and milling; lumbering.

The county is served by the main lines of the Milwaukee and Northern Pacific railroads, and by a branch of the latter system.

Assessed value of county, \$8,852,155. Average tax levy, 59.543 mills. Average per acre farm tax, 13 cents. County indebtedness, \$136,560.

HILL COUNTY

Hill county is in north-central Montana, bordering on Canada. Its surface is mainly of the rolling-prairie type and devoted to agriculture. At Havre is located the Northern Montana College and the Northern Montana Agricultural Experiment station. In the southern part is the Rocky Boy Indian reservation. Area of county, 2,907 square miles; population, 13,775.

County seat, Havre; population, 6,372; altitude, 2,505. Other important towns—Box Elder, Kremlin, Hingham, Rudyard, Gildford and Inverness.

Principal farm products—livestock, wheat, oats, barley, rye, flax, corn and hay. Number of farms, 1,423.

Industries—dairying, flour milling, natural gas production, railroad shops.

The county is crossed by the main line of the Great Northern railway and its southern portion is served by an important branch of that system.

Assessed value of county, \$27,586,939. Average tax levy, 54.909 mills. Average per acre farm land tax, 13 cents. County indebtedness, \$251,837.



HAY RESERVES FOR WINTER FEEDING

JEFFERSON COUNTY

Jefferson county is in west-central Montana. It is largely mountainous and is bounded on the west by the Continental divide. The county contains several hot springs resorts and at its county seat is located the State School for the Deaf and Blind, and the State School for the Feeble Minded. Area of county, 1,637 square miles. Population, 4,133.

County seat, Boulder; population, 926; altitude, 4,919. Other main towns are Whitehall, Cardwell, Clancy, Alhambra, Jefferson City, Wickes and Corbin.

Principal farm products—wheat, oats, sugar beets, barley, rye, hay and livestock. Number of farms, 385.

Industries—gold, silver, and lead mining.

The county is served by the main line of the Milwaukee railroad and the Butte line of the Great Northern.

Assessed valuation of county, \$12,556,520. Average tax levy 48.533 mills. Average per acre farm land tax, 9 cents. County indebtedness, \$30,876.

JUDITH BASIN COUNTY

Judith Basin county is in central Montana and is bounded on the south by the Little Belt mountains and on the northwest by the Highwoods. Area, 1,869 square miles. Population, 5,238. The Judith Basin Agricultural Experiment station is in the eastern part of the county.

County seat, Stanford; population, 509; altitude, 4,200. Other main towns are Hobson, Geyser, Raynesford, Spion Kop, Windham, Lehigh, Moccasin and Benchland.

Principal farm products—livestock, wheat, oats, barley, flax, and hay. Number of farms, 776.

Industries—coal and sapphire mining, dairying.

The county is well served by branch lines of the Great Northern and Milwaukee railroads.

Assessed valuation of county, \$18,143,428. Average tax levy, 44.163 mills. Average per acre farm land tax, 17 cents. County indebtedness, \$190,435.

LAKE COUNTY

Lake county is in northwestern Montana, and is bounded on the east by the beautiful Mission range of mountains. Within its borders is the greater portion of Flathead lake, one of the largest bodies of fresh water west of the Great Lakes. Most of the rich area of the former Flathead Indian reservation lies within the county. The St. Ignatius Indian mission and schools and the U. S. bison range are located in the county. Area of county, 1,654 square miles. Population, 9,541.

County seat, Polson; population, 1,455; altitude, 2,908. Other important towns are Ronan, Pablo, Charlo, St. Ignatius, Arlee, Rollins, Dayton and Big Arm.

Principal farm products—livestock, wheat, sugar beets, oats, corn and alfalfa. Number of farms, 1,197.

Industries—lumbering and lumber manufacturing, flour mills, dairying.

The county is served by the main line and a branch of the Northern Pacific railroad.

Assessed valuation of county, \$12,753,205. Average tax levy, 84.163 mills. Average per acre farm land tax, 35 cents. County indebtedness, \$268,856.

LEWIS AND CLARK COUNTY

Lewis and Clark county is in central Montana. Much of the western portion consists of the mountains and valleys of the main range of the Rockies, and to the east is the Big Belt range. Its county seat is the site of the State Capitol, the State Fair, the State Vocational School for Girls and several sectarian colleges and schools. U. S. Veterans' Hospital No. 72 is located here. Has daily air mail service. Area of county, 3,478 square miles. Population, 18,224.

County seat, Helena, population, 11,803; altitude, 4,110. Other main towns are East Helena, Augusta, Craig, Wolf Creek, Lincoln, Marysville and Rimini.

Principal farm products—livestock, wheat and other grains; potatoes, hay. Number of farms, 612.

Industries—mining and smelting, hydro-electric power development, brick works, foundries, meat packing, dairying.

The county is served by the Northern Pacific and Great Northern railroads, and the National Parks Airways.

Assessed value of county, \$54,585,799. Average tax levy, 43.225 mills. Average per acre farm land tax, 8 cents. County indebtedness, \$286,374.

LIBERTY COUNTY

Liberty county is in north-central Montana, bordering on Canada. It is largely a rolling, prairie country with the Sweet Grass hills, an isolated range, rising in the northwestern corner. Area of county, 1,440 square miles. Population, 2,198.

County seat, Chester; population, 387; altitude, 3,139. Other towns—Lothair, Joplin and Tiber.

Principal farm products—livestock, wheat and other cereal grains; potatoes and hay. Number of farms, 402.

Industries—natural gas production, dairying and coal mining.

The county is crossed by the main line of the Great Northern railroad.

Assessed valuation of county, \$6,795,582. Average tax levy, 56.203 mills. Average per acre farm land tax, 10 cents. County indebtedness, \$23,903.

LINCOLN COUNTY

Lincoln county is in the northwestern corner of Montana, bordering on Canada, and the panhandle of Idaho. It is entirely within the Pacific drainage, is heavily timbered and is crossed by several ranges of mountains. This county is at the lowest altitude of any of the Montana counties. Area, 3,666 square miles. Population, 7,089.

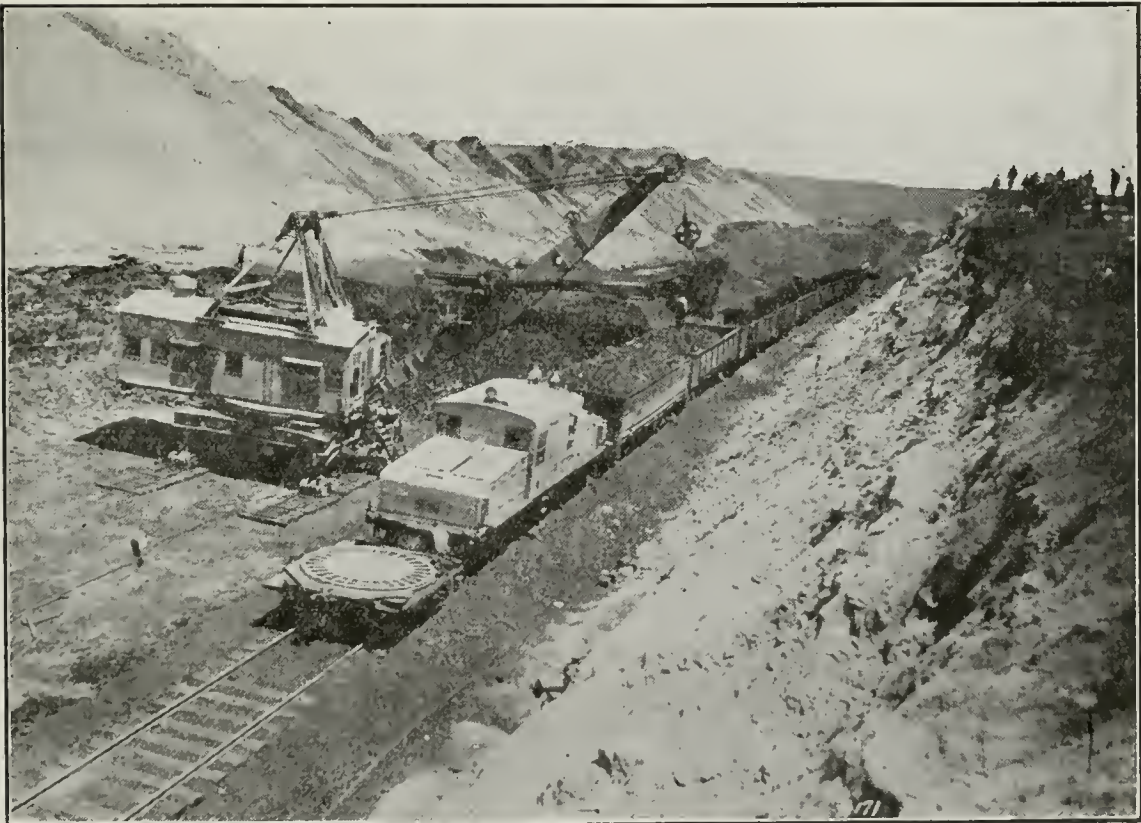
County seat, Libby; population, 1,752; altitude, 2,053. Other towns—Eureka, Troy, Warland, Rexford, Jennings, Fortine, Trego and Stryker.

Principal farm products—hay, potatoes and vegetables. Number of farm, 503.

Industries—lumbering and lumber mills, mining.

The county is crossed by the main line of the Great Northern railroad.

Assessed valuation of county, \$15,252,647. Average tax levy, 52.061 mills. Average per acre farm land tax, 7 cents. County indebtedness, \$10,015.



STRIP COAL PROPERTY IN ROSEBUD COUNTY

McCONE COUNTY

McCone county is situated in east-central Montana with the Missouri river as its north boundary. It is an inland county which until a few years ago was not reached by rail lines, but is now partially served by a branch of the Northern Pacific. It is largely a stock-raising section. Area, 2,684 square miles; population, 4,790.

County seat, Circle; population, 519; altitude, 2,800. Other main towns are Brockway, Vida and Redwater.

Principal farm products—livestock, wheat, oats, flax, rye, corn and hay. Number of farms, 1,041.

Industries—dairying.

Assessed value of county, \$14,273,907. Average tax levy, 53.880 mills. Average per acre farm land tax, 16 cents. County indebtedness, \$59,560.

MADISON COUNTY

Madison county is located in southwestern Montana. Area, 3,590 square miles. Population, 6,323. County seat, Virginia City; population, 242; altitude, 5,760.

Twin Bridges and Sheridan are the largest towns in the county. The State Orphans' Home is at Twin Bridges. Other towns are Cameron, Ennis, Jeffers, McAllister, Pony, Harrison and Jefferson Island, all located in the Madison valley. In the Ruby valley, in addition to Virginia City, are Waterloo, Silver Star, Twin Bridges, Sheridan, Laurin and Alder.

Principal farm products—livestock, hay, wheat, oats, barley, seed peas, and farm garden crops. Number of farms, 748.

Industries—mining, lumbering and hydro-electric power plant. Northern half of county is served by Northern Pacific railroad.

Assessed value of county, \$15,237,551. Average tax levy, 59.172 mills. Average farm land tax per acre, 12 cents. County indebtedness, \$58,776.

MEAGHER COUNTY

Meagher county is located in central Montana. Area, 2,412 square miles. Population, 2,272. County seat, White Sulphur Springs; population, 575; altitude, 5,280. Ringling is the shipping and distributing point for the county.

Principal farm products—livestock, hay, wheat, barley, oats, potatoes. Number of farms, 276.

Industries—stock raising, farming, dairying, and mining. The famous sulphur springs are located in White Sulphur Springs. Southern half of county is served by the Milwaukee railroad.

Assessed value of county, \$11,563,746. Average tax levy, 41.273 mills. Average farm land tax per acre, 8 cents. County indebtedness, \$273,395.

MINERAL COUNTY

Mineral county is located in west-central Montana. Area, 1,221 square miles. Population, 1,626. County seat, Superior; population, 373; altitude, 2,725.

Other towns of the county are Alberton, Iron Mountain, St. Regis, DeBorgia, Haugan and Saltese. At Haugan is located the largest forest nursery in the United States, with an annual capacity of 3,000,000 seedlings.

Principal farm products—livestock, hay, wheat, barley, oats, potatoes, fruits and vegetables. Number of farms, 906.

Industries—lumbering and mining. Mineral is one of the most heavily timbered counties in the state. The county is served by the main lines of the Northern Pacific and Milwaukee railroad systems.

Assessed value of county, \$8,860,732. Average tax levy, 47.793 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$33,120.

MISSOULA COUNTY

Missoula county is located in west-central Montana. Area, 2,649 square miles. Population, 21,782. County seat, Missoula; population, 14,657; altitude, 3,223. Missoula is the seat of the State University and headquarters of the U. S. Forest Service for Montana and northern Idaho, and is the leading banking and distributing center for western Montana.

Other towns are Bonita, Clinton, Bonner, Milltown and Frenchtown.

Fort Missoula, known as the "Million Dollar" post is located just west and south of Missoula, and is the only garrisoned post in the state.

Principal farm products—livestock, wheat, hay, oats, barley, potatoes, sugar beets, apples and small fruits. Number of farms, 688.

Industries—lumbering and lumber manufacturing; Milltown and Bonner being the second largest lumber center between the Atlantic and Pacific coasts; meat packing and manufacturing, including a beet sugar factory. The county is served by the main lines of the Northern Pacific and Milwaukee railroad systems.

Assessed value of county, \$44,166,535. Average tax levy, 58.513 mills. Average farm land tax per acre, 13 cents. County indebtedness, \$685,823.

MUSSELSHELL COUNTY

Musselshell county is located in central Montana. Area, 1,900 square miles. Population, 7,242. County seat, Roundup; population, 2,577; altitude, 3,184.

Other towns are Musselshell, Melstone and Delphia.

Principal farm products—wheat, oats, barley, corn, rye, hay and livestock. Number of farms, 525.

Industries—coal production, Musselshell being one of the leading counties in coal deposits; and manufacturing to a limited degree. The county is served by the main line of the Milwaukee railroad system.

Assessed value of county, \$11,615,399. Average tax levy, 79.797 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$786,991.

PARK COUNTY

Park county is located in south-central Montana. Area, 2,675 square miles. Population, 10,922. County seat, Livingston; population, 6,391; altitude, 4,490. The only northern rail entrance to Yellowstone National Park is from Livingston to Gardiner.

Other important towns are Emigrant, Wilsall, Clyde Park and Gardiner.

Principal farm products—wheat, oats, barley, hay, seed peas, and livestock. Number of farms, 656.

Industries—railroad and machine shops, manufacturing and mining. The county is served north and south, east and west by the Northern Pacific railroad.

Assessed value of county, \$25,485,825. Average tax levy, 47.180 mills. Average farm land tax per acre, 14 cents. County indebtedness, \$168,333.



TIMBER ENROUTE TO MILL BY WATER ROUTE

PETROLEUM COUNTY

Petroleum county is located in central Montana. Area, 1,686 square miles. Population, 2,045. County seat, Winnett; population, 408; altitude, 2,900. Petroleum is the last of the 56 counties to be created and came into existence as a result of the development of an extensive oil field, the Cat Creek field being the first producing field in the state.

Other towns are Cat Creek, Valentine and Flatwillow.

Principal farm products—wheat, potatoes, vegetables and livestock. Number of farms, 363.

Industries—Petroleum production and transportation. The western third of the county is served by the Milwaukee railroad.

Assessed value of county, \$4,944,886. Average tax levy, 68.696 mills. Average farm land tax per acre, 10 cents. County indebtedness, \$126,905.

PHILLIPS COUNTY

Phillips county is located in northern Montana, bordering on Canada. Area, 5,279 square miles. Population, 8,208. County seat, Malta; population, 1,342; altitude, 2,248. Is leading banking center and shipping point for stockgrowers.

Other towns of the county are Bowdoin, Saco and Dodson.

Principal farm products—wheat, oats, barley, potatoes, rye, flaxseed, sugar beets, alfalfa seed, hay and livestock. Number of farms, 1,476.

Industries—livestock, including sheep raising on an extensive scale; and mining. The county is served by the main line of the Great Northern railroad.

Assessed value of county, \$15,011,063. Average tax levy, 88.473 mills. Average farm land tax per acre, 12 cents. County indebtedness, \$235,805.

PONDERA COUNTY

Pondera county is located in north-central Montana. Area, 1,634 square miles. Population, 6,964. County seat, Conrad; population, 1,499; altitude, 3,500.

Other towns are Valier, in the center of the irrigated area; Dupuyer, Brady, Williams, Manson, Ledger and Fowler.

Principal farm products—livestock, wheat, oats, barley, flaxseed, corn, sugar beets, hay and truck crops. Number of farms, 919.

Industries—oil production and refining, manufacturing of dairy products, poultry raising. County is served by the Great Northern and the Montana Western railroads.

Assessed value of county, \$15,853,199. Average tax levy, 53.504 mills. Average farm land tax per acre, 18 cents. County indebtedness, \$264,438.

POWDER RIVER COUNTY

Powder River county is located in southeastern Montana. Area, 3,275 square miles. Population, 3,909. County seat, Broadus; population, estimated at 150; altitude, 3,030. Is the only town of any size in the county.

Principal farm products—wheat, oats, barley, flaxseed, corn, potatoes, beans, alfalfa seed, hay and livestock. Number of farms, 896.

Industries—stock raising is the chief industry, with alfalfa seed second. There are no railroads in the county, but a bus line operates between Broadus and Miles City.

Assessed value of county, \$8,985,927. Average tax levy, 45.453 mills. Average farm land tax per acre, 7 cents. County indebtedness, \$48,248.

POWELL COUNTY

Powell county is located in west-central Montana. Area, 2,350 square miles. Population, 6,202. County seat, Deer Lodge; population, 3,510; altitude, 4,519. Is the center of trading for a large area. At Deer Lodge is located the Montana state prison.

Other towns of the county along the railroads are Elliston, Avon, Garrison and Gold Creek. Ovando and Helmville are inland towns in the Blackfoot valley.

Principal farm products—wheat, hay, barley, oats, potatoes, sugar beets and livestock. Number of farms, 343.

Industries—the leading industries are stock raising and the Milwaukee shops. The county is served by the Northern Pacific and Milwaukee railroad systems.

Assessed value of county, \$18,476,922. Average tax levy, 45.827 mills. Average farm land tax per acre, 10 cents. County indebtedness, \$200,206.

PRAIRIE COUNTY

Prairie county is located in east-central Montana. Area, 1,737 square miles. Population, 3,941. County seat, Terry; population, 779; altitude, 2,250. Is the distributing center for a thriving community from which thousands of cars of livestock, poultry and wool are shipped annually.

Other towns of the county are Fallon, east of Terry; and Mildred, in the southern section of the county.

Principal farm products—wheat, oats, flaxseed, corn, beans, alfalfa seed, hay and livestock. Number of farms, 559.

Industries—agriculture and stock growing are the principal industries of the county. The county is served by the Northern Pacific and the Milwaukee railroad systems.

Assessed value of county, \$13,217,648. Average tax levy, 44.073 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$38,477.

RAVALLI COUNTY

Ravalli county is located in west-central Montana. Area, 2,396 square miles. Population, 10,315. County seat, Hamilton; population, 1,839; altitude, 3,600. Is the leading banking and distributing center for the Bitter Root valley.

Other towns of the county are Darby, Corvallis, Victor, Stevensville and Florence, all of them being modern and progressive.

Principal farm crops—livestock, wheat, oats, barley, corn, potatoes, seed peas, canning peas, sugar beets, hay, apples, cherries and strawberries. The Bitter Root valley is famed for its fruits and vegetables. Number of farms, 1,286.

Industries—In addition to the crops, there are two fruit and vegetable canneries and numerous plants for the manufacture of dairy products, including cheese. Two-thirds of the valley is served by the Northern Pacific railroad.

Assessed value of county, \$15,963,718. Average tax levy, 72.043 mills. Average farm land tax per acre, 37 cents. County indebtedness, \$328,364.



McINTOSH RED ORCHARDS IN BITTER ROOT VALLEY

RICHLAND COUNTY

Richland county is located in east-central Montana. Area, 2,102 square miles. Population, 9,633. County seat, Sidney; population, 2,010; altitude, 1,928. Is the leading banking and distributing center for the county and for sections of North Dakota.

Other towns in the county are Fairview, Lambert and Savage.

Principal farm products—livestock, wheat, oats, barley, rye, flaxseed, corn, potatoes, beans, sugar beets, alfalfa seed and sweet clover seed and hay. Number of farms, 1,341.

Industries—manufacturing, including a beet sugar factory; agriculture and stock raising. The county is served by the Northern Pacific and Milwaukee railroad systems.

Assessed value of county, \$16,467,528. Average tax levy, 68.261. Average farm land tax per acre, 16 cents. County indebtedness, \$189,970.

ROOSEVELT COUNTY

Roosevelt county is located in northeastern Montana. Area, 2,383 square miles. Population, 10,672. County seat, Wolf Point; population, 1,539; altitude, 2,101.

Other important towns are Culbertson, Bainville, Froid, Poplar, McCabe, Brockton, and Mondak. Poplar is headquarters for the Fort Peck Indian reservation.

Principal farm products—wheat, oats, barley, rye, flaxseed, corn, potatoes, sweet clover seed and livestock. Number of farms, 1,276.

Industries—agriculture and livestock are the principal industries, supplemented by small manufacturing establishments. The southern part of the county along the Missouri river is served by the Great Northern railroad.

Assessed value of county, \$17,700,609. Average tax levy, 88.001 mills. Average farm land tax per acre, 23 cents. County indebtedness, \$432,069.

ROSEBUD COUNTY

Rosebud county is located in southeastern Montana. Area, 5,067 square miles. Population, 7,347. County seat, Forsyth; population, 1,591; altitude, 2,515. The Northern Cheyenne Indian reservation is located in the county, Lame Deer being the agency headquarters.

Other important towns are Rosebud, Hathaway, Ingomar, Sumatra, Ashland and Finch.

Principal farm products—livestock, wheat, oats, corn, beans, sugar beets, hay, alfalfa seed and truck crops. Number of farms, 940.

Industries—the chief industries are coal mining, stock raising, and farming. The county is served by the Northern Pacific and the Milwaukee railroad systems.

Assessed value of county, \$20,552,949. Average tax levy, 58.824 mills. Average farm land tax per acre, 6 cents. County indebtedness, \$427,332.

SANDERS COUNTY

Sanders county is located in northwestern Montana. Area, 2,840 square miles. Population, 5,692. County seat, Thompson Falls; population, 468; altitude, 2,462. Other important towns of the county are Plains, Hot Springs, Dixon and Perma, which are important shipping points. Heron, Noxon, Tuscor, Trout Creek, Alger, White Pine and Belknap are located in the agricultural sections of the logged-off area.

Principal farm products—wheat, oats, barley, potatoes, hay, apples and livestock. Number of farms, 663.

Industries—lumbering and lumber manufacture, as the county possesses enormous timber resources. Agriculture, stock-raising and mining are also important activities. The county is extensively served by the Northern Pacific railroad.

Assessed value of county, \$19,350,735. Average tax levy, 47.593 mills. Average farm land tax per acre, 8 cents. County indebtedness, \$59,834.

SHERIDAN COUNTY

Sheridan county is located in north-eastern Montana. Area, 1,720 square miles. Population, 9,869. County seat, Plentywood; population, 1,226; altitude, 2,046.

Other principal towns are Antelope, Outlook, Medicine Lake, all incorporated.

Principal farm products—wheat, oats, barley, rye, flaxseed, corn, potatoes, hay and livestock. Number of farms, 1,492.

Industries—the chief industries are the raising of grains and hay, and livestock. The county is served south to north and west by the Great Northern railroad.

Assessed value of county, \$17,906,589. Average tax levy, 90.953 mills. Average farm land tax per acre, 32 cents. County indebtedness, \$465,141.

SILVER BOW COUNTY

Silver Bow county is located in southwestern Montana. Area, 719 square miles. Population, 56,969. Largest in population and smallest in area of the 56 counties. County seat, Butte; population, 39,532; altitude, 5,755. Butte is known as "the richest hill on earth," and is the largest city between the Twin Cities on the east and Spokane on the west, and between Salt Lake on the south and the Canadian border on the north. Has daily air mail service. Is site of the Montana School of Mines.

There are no other towns of any importance in the county.

Principal farm crops are oats, potatoes, hay and livestock. Number of farms, 212.

Industries—Silver Bow county is essentially a mining county, Butte having the reputation of being the world's greatest mining city. In addition to the mines there are several manufacturing plants of some importance, including oil refineries and meat packing plants. Copper mining is the chief industry. The county is served by the Great Northern, Northern Pacific, Milwaukee, Oregon Short Line and the B. A. & P. railroad systems, and by the National Parks Airways.

Assessed value of county, \$79,176,687. Average tax levy, 56.785 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$380,790.



A TYPICAL MONTANA VALLEY GRAIN FIELD

STILLWATER COUNTY

Stillwater county is located in south-central Montana. Area, 1,773 square miles. Population, 6,253. County seat, Columbus; population, 834; altitude, 3,698. County noted for historical and scenic attractions, one of which is Grasshopper glacier.

Other principal towns are Reed Point and Park City, on the main line of the Northern Pacific; Molt, Wheat Basin and Rapelje, on the Lake Basin branch of the road, and the inland towns of Fishtail and Absarokee.

Principal farm products—livestock, wheat, oats, barley, corn, potatoes, beans, seed peas, sugar beets, alfalfa and sweet clover seed, and hay. Number of farms, 962.

Industries—hydro-electric power development, carbon black manufacture and quarrying of building stone.

Assessed value of county, \$13,595,553. Average tax levy, 70.460 mills. Average farm land tax per acre, 11 cents. County indebtedness, \$276,831.

SWEET GRASS COUNTY

Sweet Grass county is located in south-central Montana. Area, 1,855 square miles. Population, 3,944. County seat, Big Timber; population, 1,224; altitude, 4,072. The land within this county is naturally adapted to livestock raising and agriculture, being well supplied with creeks which drain into the Yellowstone river.

Other important towns in the county are Greycliff, Melville and McLeod.

Principal farm products—livestock, wheat, oats, barley, rye, potatoes and hay. Number of farms, 532.

Industries—agriculture; cattle and sheep growing are the principal industries. The county is served by the Northern Pacific railroad.

Assessed value of county, \$12,715,297. Average tax levy, 39.713 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$212,616.

TETON COUNTY

Teton county is located in north-central Montana. Area, 2,295 square miles. Population, 6,068. County seat, Choteau; population, 926; altitude, 3,800. Part of the county embraces a section of the Continental divide.

Other important towns are Bynum, Pendroy, Power, Dutton and Collins along the Great Northern railroad, and Fairfield, Farmington and Agawam on the Milwaukee.

Principal farm products—livestock, wheat, oats, barley, rye, corn, potatoes and hay. Number of farms, 1,023. Teton is one of the principal agricultural counties of the state.

Industries—principally agriculture and stock raising.

Assessed value of county, \$18,127,195. Average tax levy, 59.649 mills. Average farm land tax per acre, 16 cents. County indebtedness, \$216,286.

TOOLE COUNTY

Toole county is located in north-central Montana. Area, 1,945 square miles. Population, 6,714. County seat, Shelby; population, 2,004; altitude, 3,283. Is the banking and distributing center for the largest oil field in this part of the country.

Other important towns are Kevin, Sunburst, Sweet Grass, Oilmont, and Galata. Sweet Grass is a port of entry on the Canadian border.

Industries—Oil and gas production are the principal industries, Toole county being the leading county in these commodities. There are several oil refineries under operation, and natural gas is piped from the fields to Great Falls and intervening points. County is served four ways by the Great Northern railroad.

Principal farm crops—In spite of the fact that Toole county is considered essentially an oil county, the wheat crop in 1927 was valued at a million dollars. Other crops are oats, barley, rye, corn, potatoes, hay, farm gardens and livestock. Number of farms, 597.

Assessed value of county, \$18,626,759. Average tax levy, 60.101 mills. Average farm land tax per acre, 10 cents. County indebtedness, \$428,023.

TREASURE COUNTY

Treasure county is located in southeastern Montana. Area, 998 square miles. Population, 1,661. County seat, Hysham; population, 258; altitude, 2,667. Although the third smallest county, Treasure now has 20,000 acres of irrigated land along the Yellowstone, Sarpy and Tullock valleys, and has 225,000 acres of irrigable and agricultural land, with 227,000 acres of grazing land.

Other towns in the county are Myers, Sanders and Big Horn.

Principal farm products—wheat, oats, barley, rye, potatoes, corn, beans, sugar beets, alfalfa seed, hay and livestock. Number of farms, 266.

Industries—agriculture and stock raising, also dairying and poultry raising for outside markets. The county is served by the Northern Pacific railroad.

Assessed value of county, \$5,963,985. Average tax levy, 42.699 mills. Average farm land tax per acre, 9 cents. County indebtedness, \$27,076.

VALLEY COUNTY

Valley county is located in northeastern Montana. Area, 5,064 square miles. Population, 11,181. County seat, Glasgow; population, 2,216; altitude, 2,088. Is leading banking and distributing center for a vast area and largest town in northeastern Montana.

Other important towns are Oswego, Frazer, Nashua, Hinsdale, on the Great Northern railroad, and Opheim and Glentana, 55 miles north of Glasgow, on the Great Northern branch line.

Principal farm products—wheat, oats, barley, flaxseed, corn, potatoes, sugar beets, sweet clover seed, hay and livestock. Number of farms, 1,833.

Industries—diversified farming, stock raising, dairying and manufacturing to a limited degree.

Assessed value of county, \$24,314,347.* Average tax levy, 58.970 mills. Average farm land tax per acre, 13 cents. County indebtedness, \$218,201.



HARVESTING STRAWBERRIES IN WESTERN MONTANA

WHEATLAND COUNTY

Wheatland county is located in central Montana. Area, 1,419 square miles. Population, 3,751. County seat, Harlowton; population, 1,473; altitude, 4,200. Is a railroad junction point. Other important towns are Judith Gap, Hedgesville, Shawmut and Two Dot.

Principal farm products—wheat, oats, barley, rye, corn, potatoes, hay and livestock. Number of farms, 324.

Industries—cattle and sheep raising, farming and dairying, and some manufacturing. The county is served by the Great Northern and Milwaukee railroad systems.

Assessed value of county, \$13,680,310. Average tax levy, 52.901 mills. Average farm land tax per acre, 11 cents. County indebtedness, \$174,147.

WIBAUX COUNTY

Wibaux county is located in east-central Montana. Area, 886 square miles. Population, 2,767. County seat, Wibaux; population, 619; altitude, 2,635. County is third smallest in size and known as "the gateway county of Montana." Other towns are Carlyle and Yates.

Principal farm products—wheat, oats, barley, flaxseed, corn, potatoes, hay and livestock. Number of farms, 469.

Industries—diversified farming, dairying and stock raising. The county is served by the Northern Pacific railroad.

Assessed value of county, \$7,153,941. Average tax levy, 52.403 mills. Average farm land tax per acre, 13 cents. County indebtedness, \$47,752.

YELLOWSTONE COUNTY

Yellowstone county is located in south-central Montana. Area, 2,690 square miles. Population, 30,785. County seat, Billings; third largest city in the state; population, 16,380; altitude, 3,117. Is leading banking and distributing center for south-central Montana and has daily air mail service. The Eastern Montana State Normal school is located there.

Other important towns are Laurel, Huntley, Worden, Broadview and Pompey's Pillar.

Principal farm products—wheat, oats, barley, rye, corn, potatoes, beans, seed peas, sugar beets, sweet clover seed, hay, livestock. Number of farms, 1,748.

Industries—manufacturing and distributing, including the largest beet sugar factory in the state; meat packing; the largest railroad yards and shops between St. Paul and the Pacific coast. Is one of the most productive agricultural counties in the state. The county is served by the Northern Pacific, Great Northern and Burlington railroad systems; the Northwest Airways and the Montana-Wyoming Air Lines.

Assessed value of county, \$62,251,485. Average tax levy, 48.338 mills. Average farm land tax per acre, 13 cents. County indebtedness, \$338,332.



ELK HERD IN YELLOWSTONE PARK AREA

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